| Permit No. | Date | DIN |
|---|---|---|
| **TBD** | **March 19, 2015** | **24006** |

RECEIVED
**March 12, 2015**
Solid Waste Section
Asheville Regional Office

BROOKS
ENGINEERING ASSOCIATES

Planning & Project Management / Civil Engineering
Surveying / Environmental Engineering & Services

17 Arlington Street / Asheville NC 28801
www.brooksea.com / 828-232-4700

# *MSW TRANSFER STATION PERMIT APPLICATION PACKAGE*

**Prepared for:**
**Regional Recycling Solutions, LLC**
**P.O. Box 1390**
**Etowah, NC 28729**

**Submitted To:**

**NCDENR, Division of Waste Management**
**Solid Waste Section Permitting**
**1646 Mail Service Center**
**Raleigh, NC 27699-1646**

NORTH CAROLINA PROFESSIONAL SEAL 026539 ENGINEER MARK C. BROOKS

3/10/15

**Date: March 10, 2015**

**Brooks Engineering Associates, P.A. Project No.: 412415**

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1. Current Deed
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## *1.0 General Information*

1. Name of Proposed Transfer Station:
   **Regional Recycling Solutions – Buncombe County**

2. Applicant/Owner Contact Info:
   Regional Recycling Solutions, LLC
   P.O. Box 1390
   Etowah, NC 28729
   Attn: Ken Allison
   828-891-3893
   recyclingsolutions2015@gmail.com

3. Contract Operator Contact Info:
   Same

4. Landowner Contact Info:
   Julia M. Hipps
   9883 Oak Ridge Dr.
   Zionsville, IN 46077

5. Engineer Contact Info:
   Mark Brooks, P.E.
   Brooks Engineering Associates, P.A.
   17 Arlington Street
   Asheville, NC 28801

6. Permit Fee Contact Info:
   Regional Recycling Solutions, LLC
   P.O. Box 1390
   Etowah, NC 28729
   Attn: Ken Allison

## 2.0 Property Information & Maps

7. The facility is located on Pond Road in Buncombe County NC and identified by Property Identification Number 9627-61-0961-00000 in Buncombe County. The facility was previously utilized as pasture.
8. Currently the total property acreage is 52.43 acres. This property is to be subdivided in to three parcels upon approval by County Planning and Zoning Department. The parcel serving the solid waste transfer station is to be 12.8 acres.
9. The existing deed is provided as Attachment1 which includes the existing metes and bounds. No current plat is attainable. The proposed Preliminary Plat currently being reviewed by Buncombe depicting the proposed subdivision is provided as Figure 1.
10. Enclosed as Figure 2 is a USGS Quadrangle Map with the approximate property boundary and location of the facility depicted.
11. The Zoning approval process has begun with the County. Plans and application were submitted March 9, 2015. Once the Buncombe County Planning staff reviewer (Josh O'Conner) has reviewed the application he will provide a statement regarding the approval process and site applicability.
12. Enclosed as Figure 3 is a copy of the applicable FEMA Flood Insurance floodplain map with the property depicted.
13. The delineation of jurisdictional waters has been performed by Clearwater Environmental Consultants. They have applied to the ACOE for a Jurisdictional Determination. Enclosed s Attachment 2 is a portion of the request. We anticipated having the ACOE Jurisdictional Determination in approximately 30 days. No stream or wetland impacts are proposed with the engineering plans.

## *3.0 Operations Plan*

Items 14 – 24 are addressed in the enclosed Operations Plan.

# Regional Recycling Solutions
# Etowah,
# North Carolina

# Transfer Station
# Operations Plan

## Permit --

March 10, 2015

Regional Recycling Solutions
Transfer Station
Operations Plan

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# Section 1
# Introduction

Regional Recycling Solutions is seeking a permit to operate a Solid Waste Transfer Station that accepts commercial, industrial, and residential solid waste from within Buncombe County for transfer to an approved Municipal Solid Waste Landfill (MSWLF). The Transfer Station also accepts recyclable materials for further processing. The Transfer Station is typically open six days a week with hours posted but waste and recyclables may be accepted twenty four hours a day seven days a week.

## 1.1 Purpose

This Operational Plan was prepared in accordance with the North Carolina Solid Waste Rules Section 15A NCAC 13B .0400 – Transfer Facilities. This plan addresses the operation requirements through the following sections:

Section 1: Introduction

Section 2: Waste Acceptance Criteria

Section 3: Transfer Station Operations

Section 4: Materials Recovered

Section 5: Storm Water Control and Water Protection Requirements

Section 6: Disease and Vector Control

Section 7: Sign and Safety Requirements

Section 8: Access and Security Requirements

Appendices

## 1.2 Facility Location and Zoning

The Regional Recycling Solutions Transfer Station site is located on Pond Road, adjacent to Highway 280, and is identified by Property Identification Number 9627-61-0961 in Buncombe County, North Carolina (see Appendix 2, Figure 1 for a Location Map). The Transfer Station Facility, Scale House and Visitor Education Center are located on a tract which is zoned as Commercial/Industrial. This zoning category includes public facilities such as a Solid Waste Transfer Station Facility.

## 1.3 Facility Description and Contact

The Regional Recycling Solutions Transfer Station Facility was built in 2015 and provides a central location for acceptance of solid waste and recyclables from residents and commercial businesses. The site consists of a Transfer Station Facility, Scale House and Visitor Education Center, as shown in Appendix 3, Figure 2.

The Transfer Station Facility can receive approximately 100 tons of solid waste per day and may approach 150 tons per day. The waste is transported to the Transfer Station by haulers, private and municipal-owned collection vehicles and County residents.

The tipping floor for solid waste is located inside the Transfer Station Facility, which lowers the potential for leachate generation due to waste encountering rainfall and for windblown litter. Waste water from this operation is collected and discharged to the Buncombe County Municipal Sewer System for treatment at the there Waste Water Treatment Facility.

The primary contact is:

Mr. Ken Allison
Owner/Operator
Regional Recycling Solutions
P.O. Box 1390
Etowah, NC 28729
(828) 891-3893

# Section 2
# Waste Acceptance Criteria

Regional Recycling Solutions will accept solid waste at the Transfer Station Facility. This includes waste generated through commercial, industrial and residential activities, also inclusive of residue generated through the acceptance and processing of recyclable material. Regional Recycling Solutions Transfer Station Facility shall only accept Municipal Solid Waste (MSW)/ Construction and Demolition (C&D) as defined by North Carolina General Statute 130A-290 (a) (18a).

## 2.1 Prohibited Wastes

The following wastes are prohibited at the Regional Recycling Solutions Treatment and Processing Facility, (permit: New facility).

- Barrels or drums, except for recycling
- Wastes prohibited by Statue GS 130A-309.10 of the North Carolina Solid Waste Management Rules
- Hazardous waste
- Infectious waste
- Medical waste
- Animal Waste
- Animal carcasses
- Radioactive waste
- Whole Tires, except for recycling
- Pallets, except for recycling
- Asbestos
- Liquids, except for recycling

A waste screening report identifying the waste type and hauler shall be prepared for any attempted delivery of a prohibited waste. See Section 3.3 for additional information pertaining to waste screening. Appendix 1 includes a sample waste screening reporting form. The waste screening report will be included in the Transfer Station records, which are available for review by the North Carolina Department of Environment and Natural Resources – Division of Waste Management.

## 2.2 Prohibited Wastes – Contingency Plan

Regional Recycling Solutions makes every effort to prevent prohibited waste from entering into the facility through the use of signs, questions from staff, periodic load inspections and general education. Once prohibited waste is identified and is still in the possession of the hauler, we will attempt to educate the hauler as to the proper disposal options. It is the goal of Regional Recycling Solutions to give haulers proper options to prevent illegal and unacceptable disposal practices from occurring. If prohibited waste is found, then Regional Recycling Solutions will take steps to properly identify hauler and source to allow them the opportunity to properly dispose of waste. If hauler is not identified, then Regional Recycling Solutions will take appropriate action to dispose in a manner acceptable to Federal, State and local rules and regulations.

Regional Recycling Solutions staff will make every effort to preclude acceptance of prohibited waste through education and inspection, but in the case of inadvertent receipt of these wastes, personnel will be available to isolate the material and take appropriate measures which will include requiring the generator to remove it for appropriate disposal, and notification to the regulating authorities. In the event hazardous materials are disposed, the initial response will be from Emergency Management by calling 911.

## 2.3 Recyclable Materials

Recyclable materials are accepted at our Facility. The Transfer Station accepts recyclable materials for processing. Recyclable material is brought from Convenience Centers, municipalities, County, or delivered by residents and commercial haulers to name a few. The material may contain mixed glass, plastics, aluminum, steel cans, and mixed paper including but not limited to Cardboard and newspaper. In addition to the material other items such as sawdust, sheetrock, oils, carpet and padding, white goods and asphalt shingles may be accepted at this facility. Additional items may be added or taken away depending on its marketability.

As markets shift and landfill bans continue, Regional Recycling Solutions will continue to adapt to accept recyclable materials. Regional Recycling Solutions accepts recyclables from any location.

The following items are currently accepted for recycling:

- Lead-acid batteries
- Newspaper and mixed paper
- Corrugated cardboard, brown paper bags and chipboard
- Plastic bottles as well as rigid plastics and High Density Polyethylene or HDPE
- Aluminum cans
- Clear, green and brown glass
- Steel and tin cans
- White goods
- Scrap metal
- Asphalt Shingles and other C&D material
- Cooking oil
- Used oil and filters
- Other items as markets develop

# Section 3
# Transfer Station Operations

A sign is posted at the entrance to the facility identifying the minimal hours of operation for accepting waste but waste can be accepted twenty four hours a day seven days a week. The Regional Recycling Solutions Transfer Station Facility's operating days are generally Monday through Saturday. The Facility is closed on Sundays, and normally but not limited to the following holidays:

- Thanksgiving Day
- Christmas Day
- New Year's Day
- Memorial Day
- July 4th
- Labor Day

## 3.1 Transfer Station Operations

Vehicles delivering waste to the facility may be directed to the Scale House for weighing. Once vehicles enter the site they are directed to the appropriate location. Waste will then be placed in the appropriate container or tipping floor area of the Transfer Station. Recyclable material may be pulled from the waste for further processing. Wastes are loaded into transfer trailers and/or containers for transport to the landfill. Transfer Station employees are properly trained in safety procedures and the inspection of incoming wastes. Training materials published by the North Carolina Solid Waste Association of North America (NCSWANA) are utilized for initial training of on-site personnel and for continuing education.

The tipping floor area is mainly utilized for waste; it will be cleaned and cleared of waste periodically. The waste water is collected in floor drains where it enters the Buncombe County Municipal Sewer System for treatment at their Waste Water Treatment Facility.

Windblown trash is collected during the day and stored for transportation to the landfill in accordance with 15A NCAC 13B.0302(7). Windblown trash should not be an issue due to the operations being located indoors and or containerized.

The transfer trailers and or containers are either enclosed and/or tarped so litter cannot be blown from them.

## 3.2 Maintenance

General facility maintenance will be performed either within or outside of normal operating hours when necessary. In the event significant repairs are required, some waste shall be diverted to the Landfill, if necessary, until such repairs are completed.

## 3.3 Waste Screening Operations

Waste entering the facility may be directed to the Scale House for weighing before entering the facility. Loads are visually inspected as they are deposited into the container or onto the tipping floor. Should prohibited waste, as defined in Section 2 be identified, material will be isolated and the material from the hauler will be reloaded onto the vehicle and removed from the facility as practicable. In the event that the hauler has left the facility, Regional Recycling Solutions will dispose of the waste at the proper disposal site. If the prohibited waste cannot be retrieved prior to loading, the load will be identified at the Transfer Station Facility and Regional Recycling Solutions will contact the landfill to ensure the prohibited waste can be removed there. Reporting of the event will be recorded and reported as defined in Section 2.1.

Should a "hot load" occur in a vehicle using the Transfer Station Facility; the load will be extinguished before unloading, if possible. If the load must be unloaded, it will be unloaded in or adjacent to fire suppressant means and kept segregated from other incoming waste. Once the load has been extinguished and the cause determined, the load will be taken to the landfill for disposal. The fire department will be called, if necessary.

# Section 4
# Materials Recovered

## 4.1 Overview

Regional Recycling Solutions operates a Transfer Station Facility. Normal hours of operation will be posted. As material is dropped off at the Facility, recyclables may be removed for further processing. The recyclable material may include items such as cardboard, sheet rock, carpet and padding, batteries, and plastics. Recyclables such as asphalt shingles, rigid plastics, recyclables and glass may be stored in outdoor storage locations as necessary.

## 4.2 Personnel

The Transfer Station is owned and operated by Regional Recycling Solutions. The employees are properly trained in safety procedures and the inspection of incoming wastes as stated in Section 3.1.

## 4.3 Characterization of Recyclables Stream

The materials recovered at the Transfer Station may include but not limited to the following items, as well as those noted in Section 2.3 above:

- Newspaper
- Cardboard
- Mixed Paper
- Aluminum Cans
- Steel Cans
- Clear, Brown and Green Glass
- #1 Plastic (PETE)
- #2 Plastic (HDPE)
- #3 - #7 Plastics
- Mixed rigid plastics
- White Goods and scrap metal
- Sheet Rock
- Wood

Additional materials recovered:

- Batteries
- Oil
- Oil filters
- Sheet rock
- Electronics
- Asphalt Shingles
- Wood
- Pallets

# Section 5
# Storm Water Control and Water Protection Requirements

The Regional Recycling Solutions Transfer Station Facility will be operated to contain and properly discharge collected leachate into the Buncombe County Municipal Sewer System for treatment at their Waste Water Treatment Facility.

The tipping floor is sloped toward the floor drains thus collecting any leachate generated during operations. The Transfer Station drainage system collects and contains the leachate for discharge into the Buncombe County Municipal Sewer System for treatment at their Waste Water Treatment Facility.

The Regional Recycling Solutions Transfer Station Facility shall apply for coverage under General Stormwater Permit NCG130000. Periodic examination of site storm drainage features is conducted. On-site storm water is directed through a piping network and surface ditches to the existing sediment basin/storm water control structures prior to discharge into the nearby streams.

## 5.1 Maintenance and Cleaning of Floor Drains

The floor drains are cleaned and washed down routinely at which time they are visually inspected for clogging. Should the drains become clogged or are not operating as intended, Regional Recycling Solutions may obtain a suitable contractor to repair the piping and return the system to normal service.

# Section 6
# Disease and Vector Control

The Regional Recycling Solutions Transfer Station Facility will provide sufficient vector control measures for the protection of human health and the environment. Disease vectors are defined as any rodent, flies, mosquitoes, or other animals, including insects, capable of transmitting disease to humans.

Control of disease vectors will be maintained by implementation of a routine cleaning program, which includes removal of waste, leachate, and ponded water from the facility's operating areas. The Transfer Station Facility will periodically utilize wash water to keep the tipping floor clean and free from vectors. Ponded water will be removed in order to prevent mosquito breeding. A licensed contractor may be contracted as necessary to aid in vector control.

# Section 7
# Sign and Safety Requirements

## 7.1 Sign Requirements

Regional Recycling Solutions will post signage indicating minimal hours of operation, tipping fees for waste and permit number. Signage will be clearly posted indicating which wastes are prohibited at the facility. Traffic signs and markers will be provided as necessary to promote an orderly traffic pattern.

Open burning of waste is prohibited at the Transfer Station Facility.

## 7.2 Fire Protection Equipment

Equipment will be provided to control accidental fires. The Facility is equipped with the appropriate number of fire extinguishers and fire hydrants to effectively control accidental fires. The Facility is inspected periodically by the Fire Marshal for compliance with the fire code. The Facility is located within the _Enka___ Fire District.

## 7.3 Notification of Fire

In the event of a fire, the local fire department will be contacted by dialing 911.Fires that occur at the Regional Recycling Solutions Transfer Station require verbal notice to the Division of Solid Waste within 24 hours and written notification within 15 days. Verbal and written notification will be submitted to the Asheville Regional Office.

North Carolina Department of Environment and Natural Resources
Asheville Regional Office
2090 US Highway 70
Swannanoa, North Carolina 28778
(828) 296-4500

## 7.4 Contingency Plan

In the event of equipment failure, fire, severe weather, or other unplanned event, we will notify the North Carolina Department of Environment and Natural Resources with our situation and corrective actions as follows.

### 7.4.1 Equipment Failure

Routine maintenance is performed on all equipment to minimize down time. In the event of equipment failure, when possible, back up equipment may be obtained from a rental company. In the event that significant repairs are required that would preclude the use of the Facility, some waste may be temporarily stored and/or diverted to a Landfill. Once repairs are completed Regional Recycling Solutions will resume normal operations.

### 7.4.2 Inclement Weather

Inclement weather will be considered on a case-by-case basis. If operations cannot be performed as required to safely transfer waste material, the facility will be closed and the waste may be temporarily stored and/or diverted to a Landfill until operations can be returned to normal.

### 7.4.3 Fire

By keeping the Transfer Station Facility clean and providing visual inspections of incoming loads, the potential for fires will be minimized. In the event of a fire, the local fire department will be notified immediately by dialing 911. Should a fire occur that causes damage to the facility prohibiting normal transfer operations, waste may be temporarily stored and/or diverted to a Landfill until repairs can be completed and operations returned to normal.

# Section 8
# Access and Security Requirements

## 8.1 Treatment and Processing Facility Access and Security

The Transfer Station is secured by means of gates to prevent unauthorized entry. All vehicles delivering waste and/or recyclables to the facility are required to enter and exit though controlled access. Unauthorized vehicle access to the facility is prevented around the remaining portion of the by a fence or natural barriers.

## 8.2 Trained Employees

The Transfer Station Facility shall have a Certified Scale Operator located in the Scale House during operating hours. In addition, a minimal of a Transfer Station Operator will be at the facility during operating hours. The Scale Operator and/or a NCSWANA Certified Transfer Station Operator are responsible for verifying that all vehicles comply with the permitted operational requirements.

## 8.3 Access Road

The access roads for the Regional Recycling Solutions Transfer Station Facility are constructed of a combination of gravel, asphalt and concrete. The road is maintained in good operating condition and prompt attention is given to any potholes, ruts and debris in order to prevent damage to vehicle traffic. Access roads are graded and maintained in a manner that allows for proper drainage.

# Appendix 1
# Sample Waste Screening Reporting Form

# REGIONAL RECYCLING SOLUTIONS

## Buncombe County Transfer Station Facility

WASTE SCREENING FORM
PERMIT 00-00

Date:_____ Time:_____ Inspected by:_____

Truck # _____ Owners Name: _____

Drivers Name: _____ Weight of Waste: _____

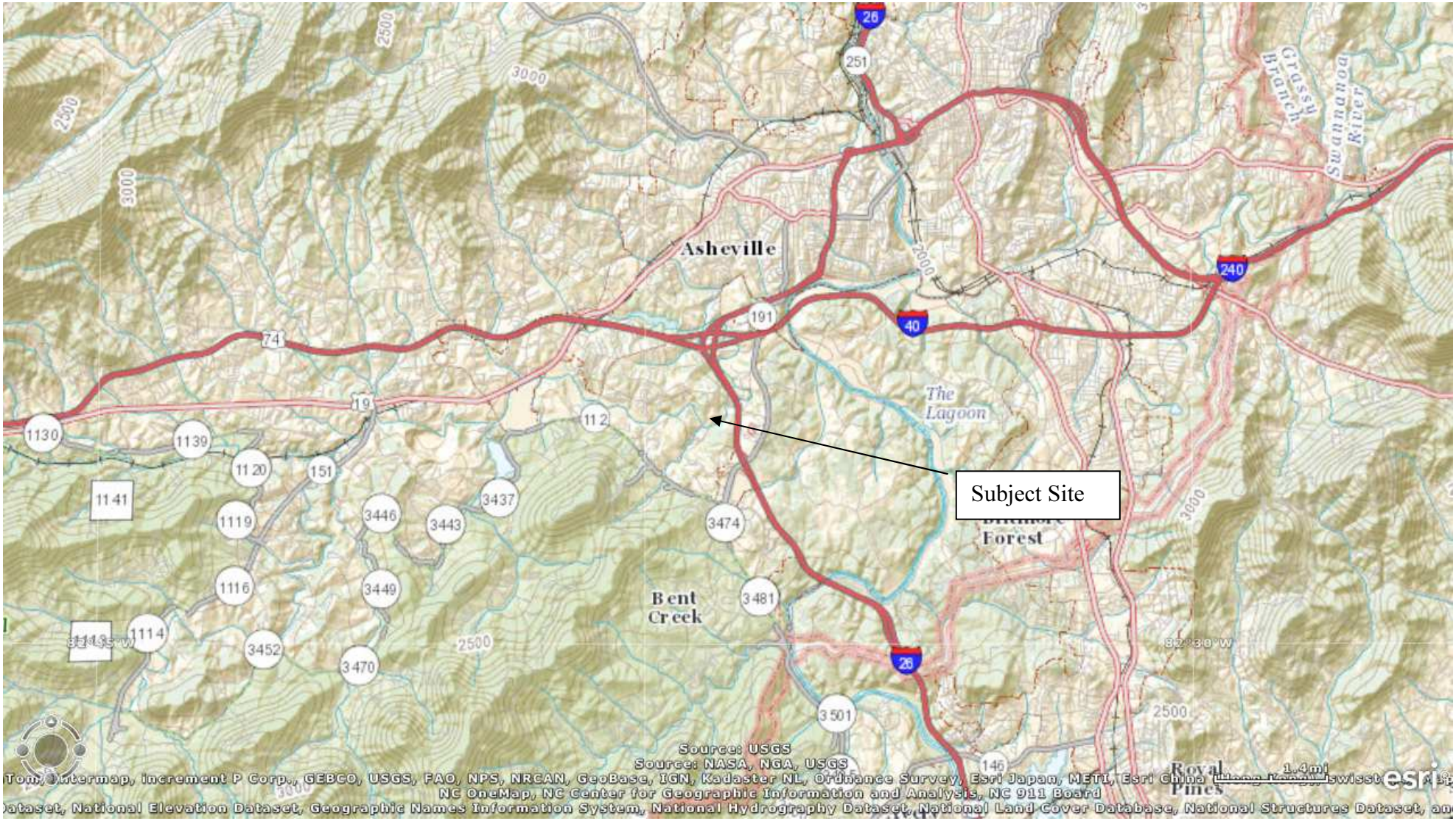
Type of Waste: COMMERCIAL INDUSTRIAL RESIDENTIAL

CHECK APPROPRIATE COLUMN

| Excluded Waste | Yes<br>Yes - Found in load | No<br>No - Did not find | If yes, how was waste disposed |
|---|---|---|---|
| Toxic hazardous waste | | | |
| PCB waste | | | |
| Tires | | | |
| Batteries | | | |
| Yard waste | | | |
| C & D waste | | | |
| Metal | | | |
| Liquids | | | |

Comments:_____
_____
_____

# Appendix 2
# FIGURE 1 – Location Map




# FIGURE 1
# SITE LOCATION

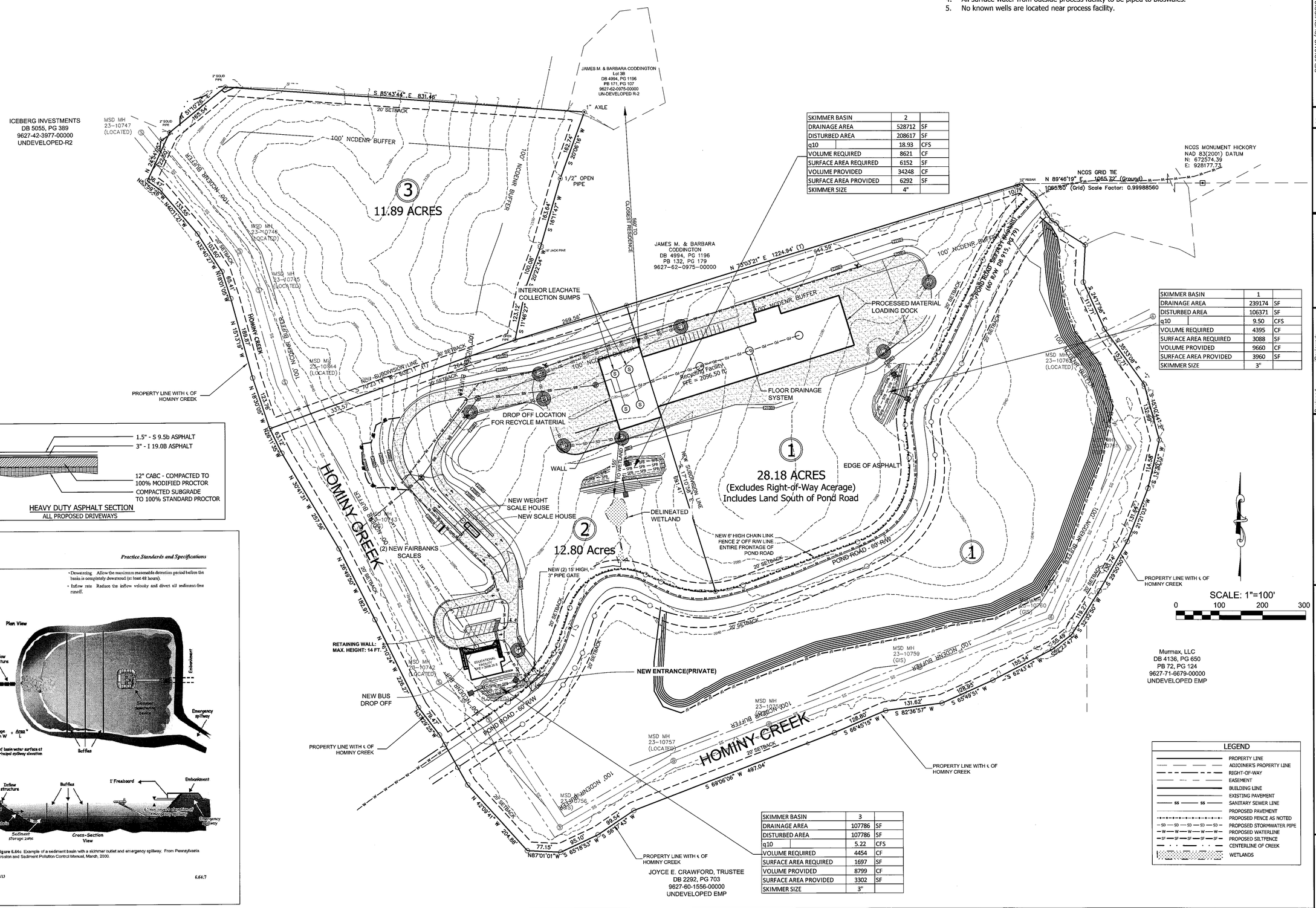
Scale as shown.

Note: Extracted from ARC GIS USGS base mapping digital geographic data.

# FIGURE 2 – Site Plan

GENERAL NOTES:

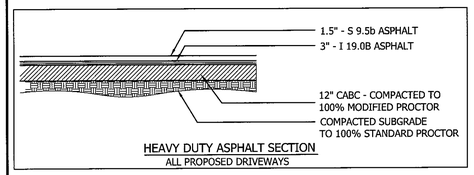
1. All recycleable storage areas are to be inside proposed process facility.
2. All waste handling areas are to be inside proposed process facility.
3. All process facility leachate and runoff to be collected and piped to MSD sewer line.
4. All surface water from outside process facility to be piped to Bioswales.
5. No known wells are located near process facility.




| SKIMMER BASIN | 2 | |
|---|---|---|
| DRAINAGE AREA | 528712 | SF |
| DISTURBED AREA | 208617 | SF |
| q10 | 18.93 | CFS |
| VOLUME REQUIRED | 8621 | CF |
| SURFACE AREA REQUIRED | 6152 | SF |
| VOLUME PROVIDED | 34248 | CF |
| SURFACE AREA PROVIDED | 6292 | SF |
| SKIMMER SIZE | 4" | |

| SKIMMER BASIN | 1 | |
|---|---|---|
| DRAINAGE AREA | 239174 | SF |
| DISTURBED AREA | 106371 | SF |
| q10 | 9.50 | CFS |
| VOLUME REQUIRED | 4395 | CF |
| SURFACE AREA REQUIRED | 3088 | SF |
| VOLUME PROVIDED | 9660 | CF |
| SURFACE AREA PROVIDED | 3960 | SF |
| SKIMMER SIZE | 3" | |

| SKIMMER BASIN | 3 | |
|---|---|---|
| DRAINAGE AREA | 107786 | SF |
| DISTURBED AREA | 107786 | SF |
| q10 | 5.22 | CFS |
| VOLUME REQUIRED | 4454 | CF |
| SURFACE AREA REQUIRED | 1697 | SF |
| VOLUME PROVIDED | 8799 | CF |
| SURFACE AREA PROVIDED | 3302 | SF |
| SKIMMER SIZE | 3" | |




HEAVY DUTY ASPHALT SECTION
ALL PROPOSED DRIVEWAYS

*Practice Standards and Specifications*

- Dewatering Allow the maximum reasonable detention period before the basin is completely dewatered (at least 48 hours).
- Inflow rate Reduce the inflow velocity and divert all sediment-free runoff.

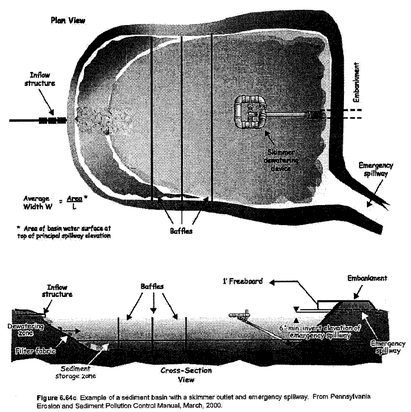



Figure 6.64c Example of a sediment basin with a skimmer outlet and emergency spillway. From Pennsylvania Erosion and Sediment Pollution Control Manual, March, 2000.

Rev. 5/13 6.64.7

| No. | REVISIONS/SUBMISSIONS | Date |
|---|---|---|
| | | |

Revision/Submission number with a triangle indicates changes made on this sheet

PERMIT DOCUMENTS

Designed: TMM
Drawn: GLW
Checked: TMM
Reviewed: TMM
Scale: AS NOTED
Date: 03-05-15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Planning • Engineering • Surveying • Environmental Services •


REGIONAL RECYCLING SOLUTIONS
BC RECYCLING CENTER
BUNCOMBE COUNTY NORTH CAROLINA

Project No: 412415
EV-1.0
Drawing Title: NCDENR SOLID WASTE PLAN

## *4.0 Sedimentation & Erosion Control Plans*

33. Enclosed as Figure 4

## 5.0 Financial Assurance

34. Financial Assurance Calculations required for formulation of a Financial Assurance Plan are as follows:

Volume of Solid Waste: 100 tons per day (tpd)

Weekly Volume = 100 tpd x 5.5 days = 550 tons

Cost to Remediate:

Buncombe County Landfill Fees @$46/ton = $25,300 per week

Trucking Fees @ $20/ton = $11,000 per week

Loading & Cleanup Fees @ $100/hr for 2 days = $1600

Total Weekly Cost = $37,900

## *6.0 Traffic Study*

35. The Traffic Study is enclosed. Application has been submitted to NCDOT for the Driveway Permit and is in review.

# TRAFFIC IMPACT ANALYSIS

For

# POND ROAD RECYCLING CENTER

## LOCATED IN BUNCOMBE COUNTY NORTH CAROLINA

Prepared For:
Ken Allison
Recycling Solutions

Prepared By:
J. M. Teague Engineering, PLLC
525 North Main Street
Waynesville, North Carolina 28786

March 2015

NORTH CAROLINA PROFESSIONAL SEAL 022948 ENGINEER J. MARK TEAGUE

3/10/15

*JMT Project 0396*
*Client 0352-01-12- 0396*

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## INTRODUCTION AND BACKGROUND

This report summarizes the findings of the Traffic Impact Analysis (TIA) that was performed for the proposed 52 acre Solid Waste / Recycling Transfer Station on Pond Road west of McIntosh Road (SR 3426) near Hominy Creek in Buncombe County, North Carolina.

The proposed Solid Waste / Recycling Transfer Station is expected to add heavy truck traffic to the Pond Road area. The purpose of this study is to determine the impact of the anticipated heavy truck traffic associated with the proposed Solid Waste / Recycling Transfer Station including trip generation, trip distribution, intersection delay, vehicle queue, and intersection capacity. Each of these aspects will be analyzed for existing and build-out conditions to determine any potential adverse traffic impacts on the adjacent roadway network from the proposed development.

This report will also provide guidance to the recommended placement of the site access location while taking into account available sight distances and the proposed development's anticipated traffic characteristics.

## PROPOSED SITE USE AND ACCESS

The proposed Solid Waste / Recycling Transfer Center Station will encompass 52 acres and have one full-movement site access point onto Pond Road *(Figure 1)*. The development will consist of a recycling transfer station, weigh station, and educational facility, which will provide site tours and educational presentations to local schools and organizations throughout the region. The entrance to the facility was relocated from the original proposed location in an attempt to accommodate the required adequate sight distance. *(Figure 2)*

*FIGURE 1 – PROPOSED SITE LOCATION*

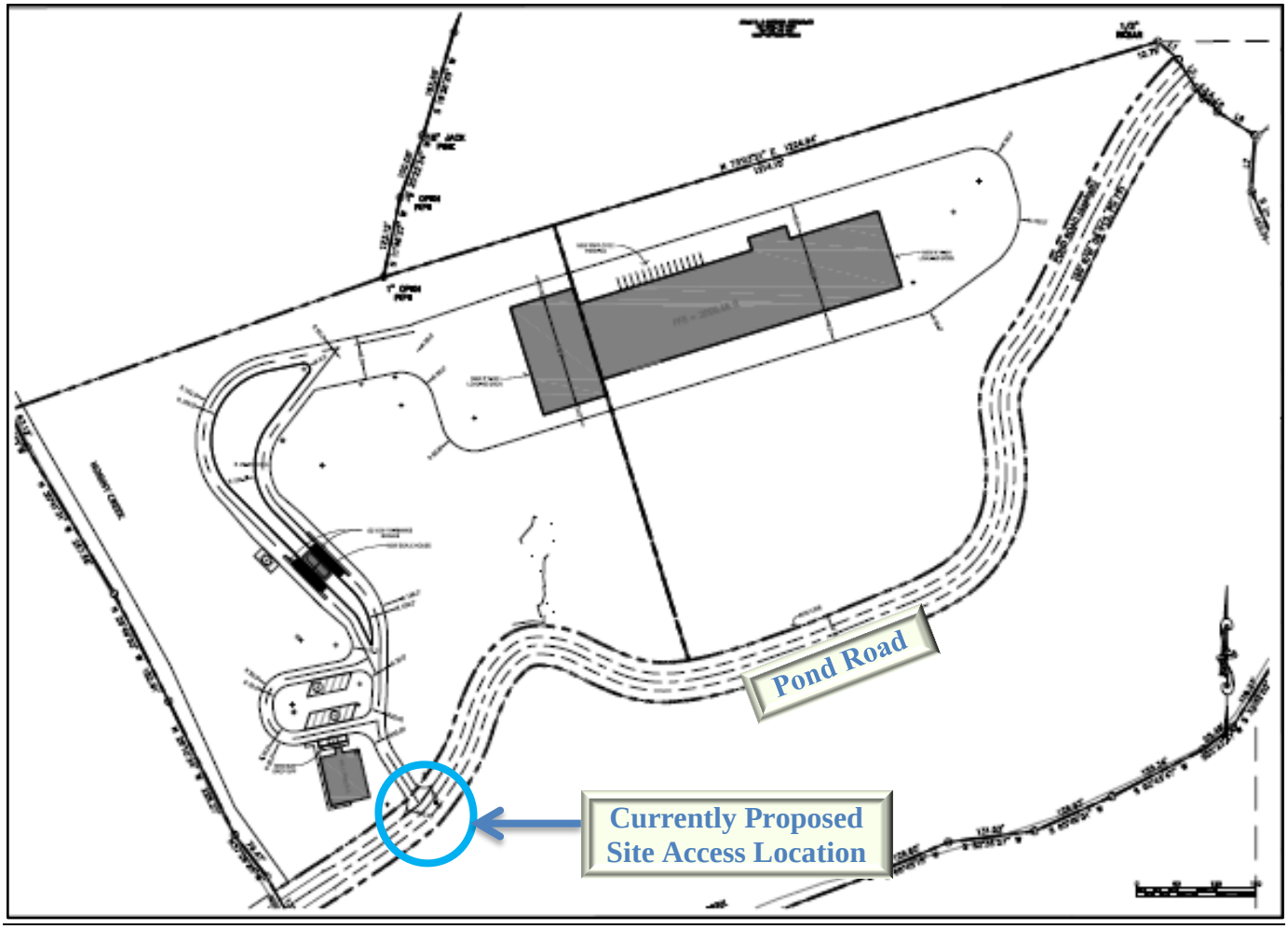



*FIGURE 2 - PROPOSED SITE PLAN*

## PARAMETERS AND STUDY AREA

As determined through engineering judgment, this study area encompasses Pond Road between Brevard Road (NC 191) and Sardis Road (NC 112). Existing weekday peak period turning movement counts were conducted at the following locations:

- Pond Road @ Sardis Road (NC 112)
- Pond Road @ Brevard Road (NC 191)

Peak period turning movement counts were obtained for the AM Peak Period (7:00 – 9:00 AM) and PM Peak Period (4:00 – 6:00 PM). AM and PM peak hours for each intersection were analyzed for existing traffic conditions and full build-out traffic conditions (2015).

Based on turning movement count data, the AM and PM peak hours were determined to be:

- Pond Road @ NC 112
  - AM Peak Hour: 7:30 AM - 8:30 AM
  - PM Peak Hour: 5:00 PM – 6:00 PM
- Pond Road @ NC 191
  - AM Peak Hour: 7:30 AM - 8:30 AM
  - PM Peak Hour: 4:45 PM - 5:45 PM

Other parameters include:

- Peak Hour Factor of 0.90 for analysis

## SURROUNDING LAND USES

The proposed site is located in within Buncombe County, NC and is adjacent to existing heavy industrial land uses such as Waste Management's Recycling Center, Caterpillar's Carolina Tractor Facility, Southern Concrete Materials, Plasticard Products, and multiple car dealerships. Biltmore Square Mall and other commercial / retail land uses are located south of the proposed development. The Enka and Candler areas are located to the west of the proposed development.

## SURROUNDING ROADWAYS

According to NCDOT's Online GIS, NC 191 (Brevard Road) is classified as a minor arterial. NC 191 is a four-lane highway and the posted speed limit is 45 mph within the vicinity of the proposed development. According to NCDOT data, the 2012 Average Annual Daily Traffic (AADT) on NC 191 within the vicinity of the proposed development was 14,000 vehicles per day (vpd) north of Pond Road and 12,000 vpd south of Pond Road.

NC 112 (Sardis Road) is classified as minor arterial according to NCDOT's Online GIS. NC 112 is a two-lane road with a posted speed limit of 45 mph within the vicinity of the proposed development. According to NCDOT data, the 2012 Average Annual Daily Traffic (AADT) on NC 112 within the vicinity of the proposed development was 11,000 vpd north of Pond Road.

Pond Road is classified as local road according to NCDOT's Online GIS and is a two-lane roadway with a speed limit of 35 mph within the vicinity of the proposed development. There are multiple horizontal and vertical grade changes along the entirety of Pond Road. Pond Road connects NC 191 to NC 112.

## EXISTING TRAFFIC

As stated above, the baseline turning movement counts were obtained for the AM and PM peak periods at the intersections of Pond Road @ NC 112 and Pond Road @ NC 191. These traffic counts captured the existing heavy truck traffic already within the study area. The AM and PM peak hours were identified and the existing peak hour volumes are shown in *Figure 3.* The complete existing turning movement counts can be found in *Appendix A.*

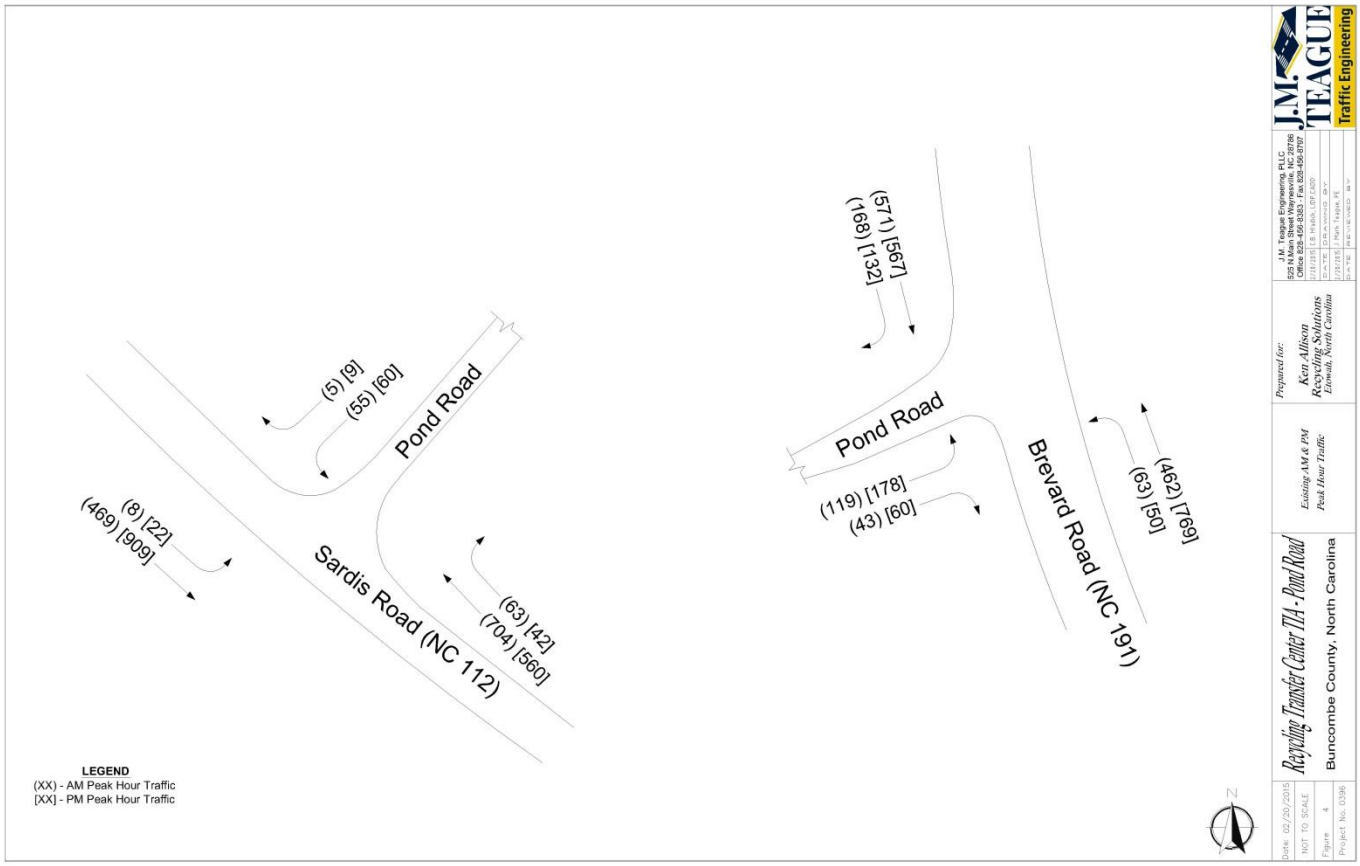



***FIGURE 3– EXISTING AM AND PM PEAK HOUR TRAFFIC***

## BACKGROUND TRAFFIC

Background traffic is defined as the traffic that would be at the studied intersections at the time of anticipated project completion (build-out), with or without the proposed development. This is known as the Background Traffic Year. Background traffic is comprised of existing traffic and any increase or decrease in volumes which might occur from general growth trends in the surrounding area or from nearby specific developments.

Although there are several methods in determining the background traffic and the corresponding growth rate; the generally accepted method is to use 2% annual growth unless other information is available. The anticipated project completion year (build-out) is 2015. Because project completion is expected to be completed within a year of the Existing Traffic Year, background traffic is not a factor with this particular study.

## TRIP DISTRIBUTION

The trip distribution for this development was estimated from the existing traffic volume patterns, surrounding population densities, and engineering judgment. Trip distribution percentages, including the anticipated heavy truck traffic percentage breakdown, are shown in *Figures 4 & 5*.

## TRIP GENERATION

The latest edition of the Trip Generation Manual published by the Institute of Transportation Engineers (ITE) is typically used as a baseline to determine site generated traffic. However, trip generation information relating to a Solid Waste / Recycling Transfer Station land use is not available within the ITE Trip Generation Manual. Because of this, the trip generation data was determined through discussions with experienced solid waste / recycling center professionals and engineering judgment.

It is believed that roughly 60 heavy trucks per day will travel to and from the proposed development under complete build-out conditions. Of the anticipated 60 heavy truck per day, it was assumed that roughly 20% of the heavy trucks (12 per peak hour) would travel to and from the proposed site within both the AM and PM peak hours.

The employee trip generation was based on number of parking spaces anticipated for the proposed development. It was assumed roughly 60% of the 41 available parking spaces throughout the site would be for employees, visitors, and educational center staff. This resulted in 26 trips for the AM ingress and PM egress movements. The remaining parking spaces will accommodate site visitors during non-peak hours.

Under full build-out conditions, it was assumed that roughly 10 "light truck" commercial trips would occur during the AM and PM peak hours under full build-out conditions. "Light truck" traffic would be classified as vehicles smaller than heavy trucks but larger than passenger vehicles.

The studied land use and the associated typical weekday trip generation spreadsheet is shown in *Table 1*.

| Trip Generation | AM | | PM | |
|---|---|---|---|---|
| | In | Out | In | Out |
| Heavy Trucks | 12 | 12 | 12 | 12 |
| Employees (Passenger Vehicles) | 26 | 0 | 0 | 26 |
| Light Trucks | 10 | 10 | 10 | 10 |
| **Trip Generation Totals** | **48** | **22** | **22** | **48** |

*TABLE 1 – TYPICAL TRIP GENERATION*

Trip assignments were distributed using the percentages found in *Figures 4 & 5* and shown as AM and PM Peak Hour ingress and egress site generated trips in *Figures 6 & 7*.

## BUILD-OUT TRAFFIC

Build-out traffic is defined as the total traffic volume that will be present on the surrounding roadway network at the time of project completion and full occupancy. This time is assumed to be 2015. Build-out traffic was calculated by adding the existing traffic and site generated traffic. *Figure 8* shows the anticipated build-out traffic.

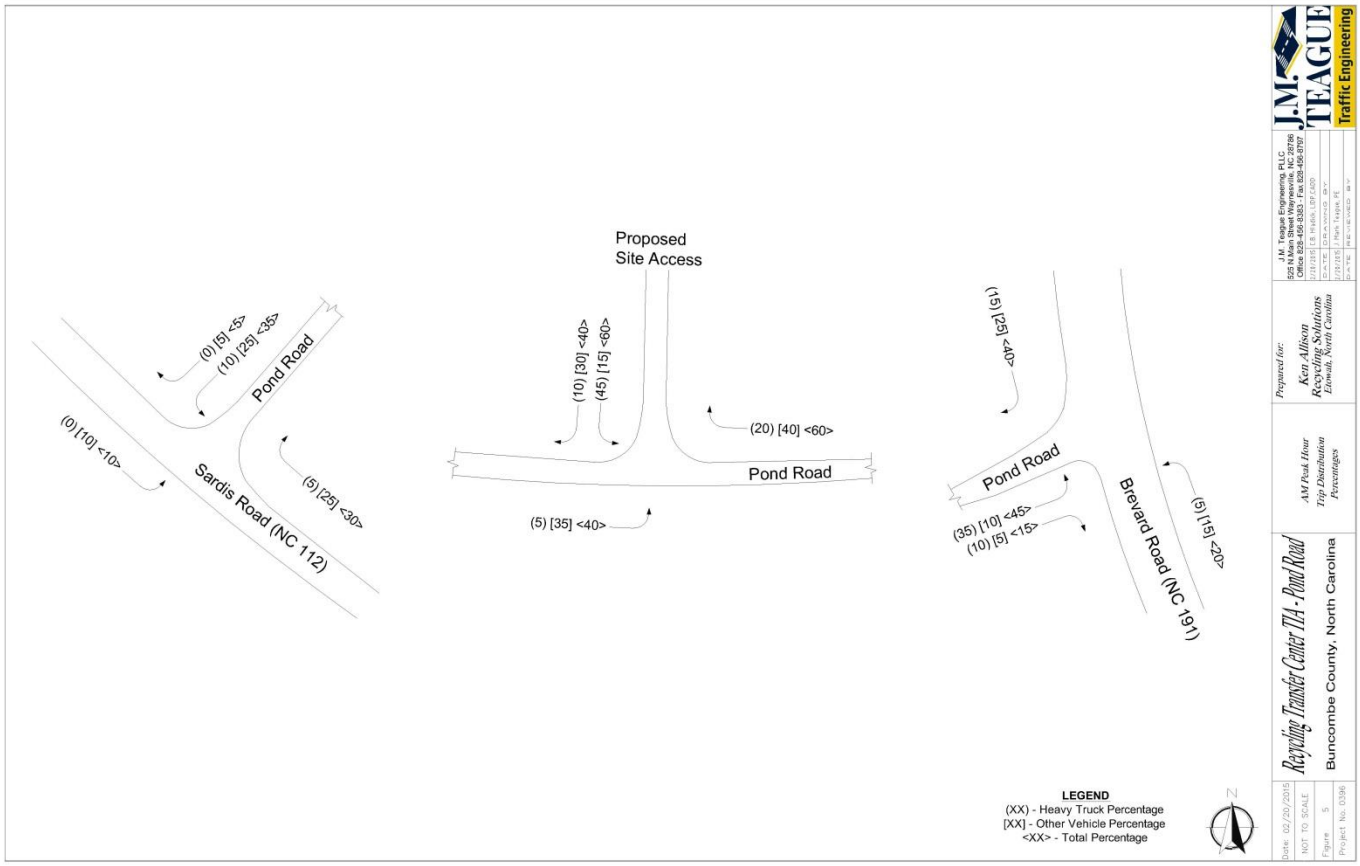



***FIGURE 4 – TRIP DISTRIBUTION PERCENTAGES AM HOUR***

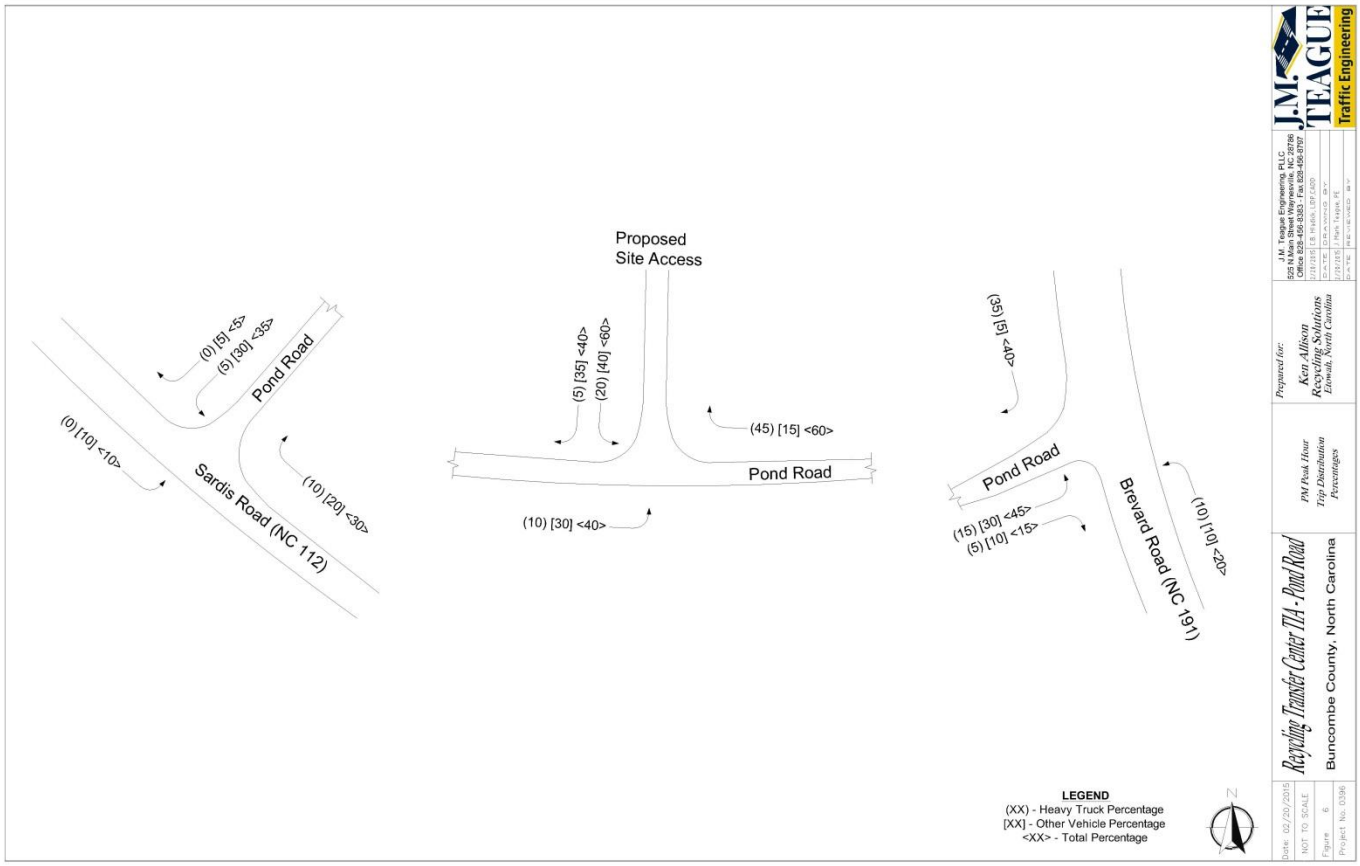



***FIGURE 5 – TRIP DISTRIBUTION PERCENTAGES PM PEAK HOUR***

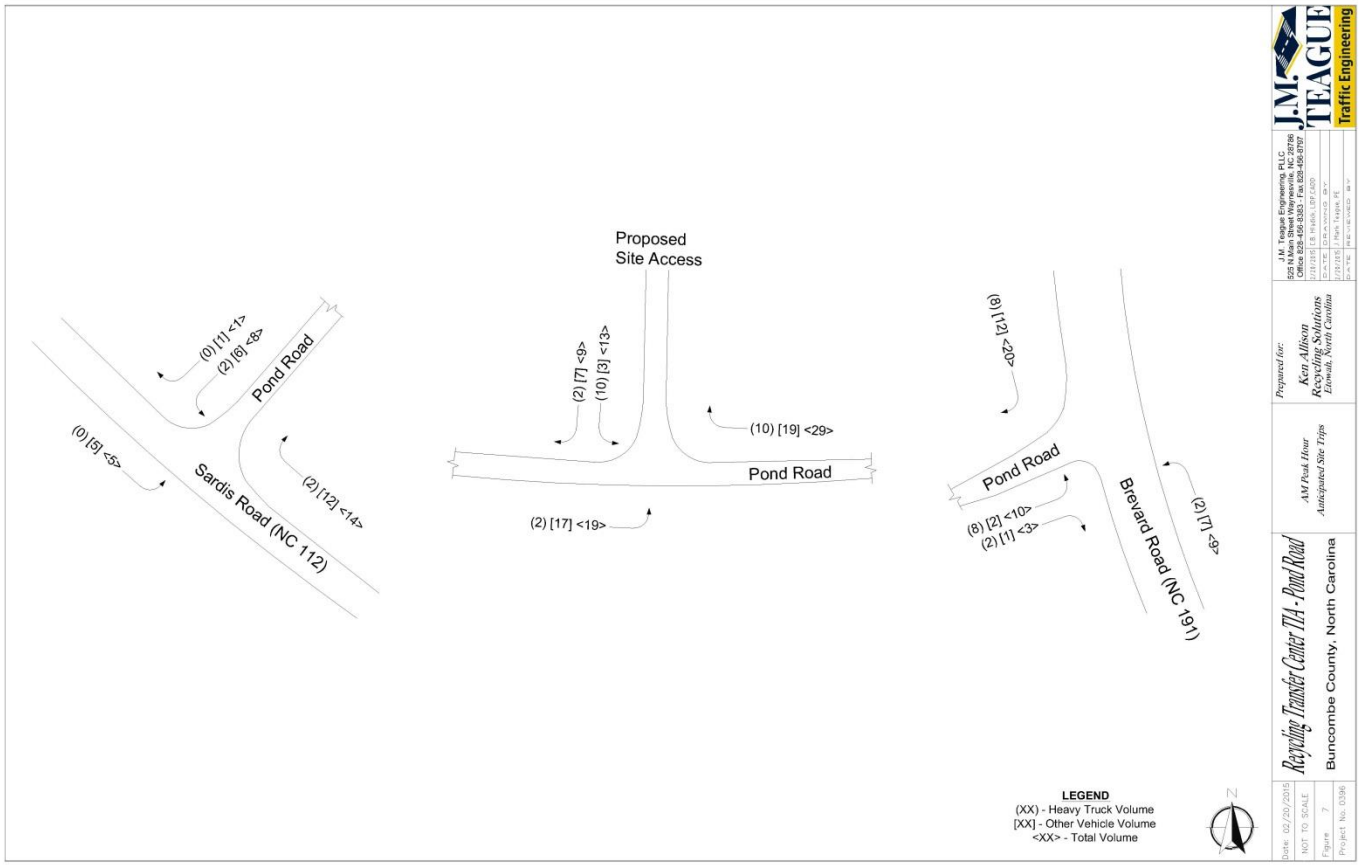



***FIGURE 6 – ANTICIPATED SITE TRIPS AM PEAK HOUR***

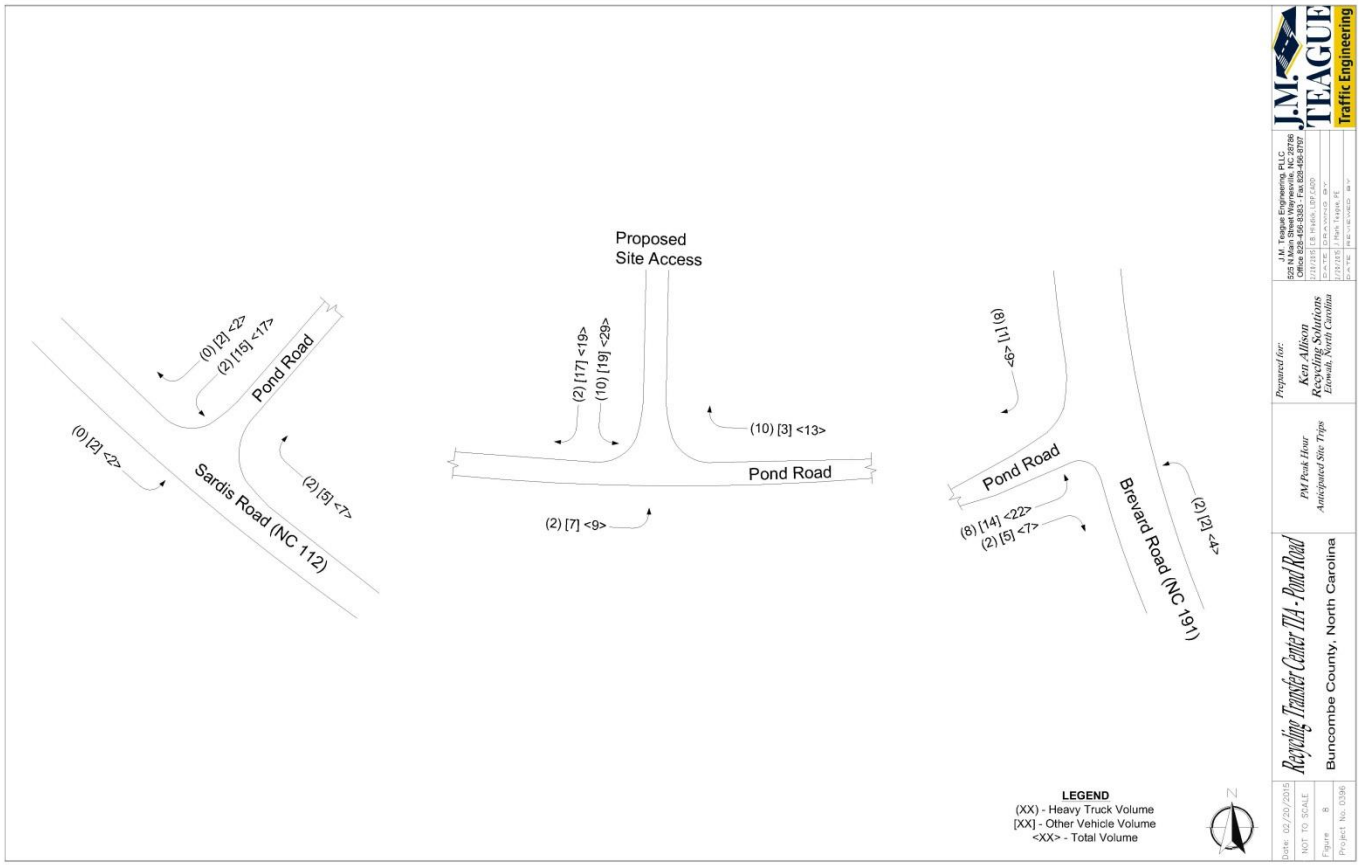



***FIGURE 7 – ANTICIPATED SITE TRIPS PM PEAK HOUR***

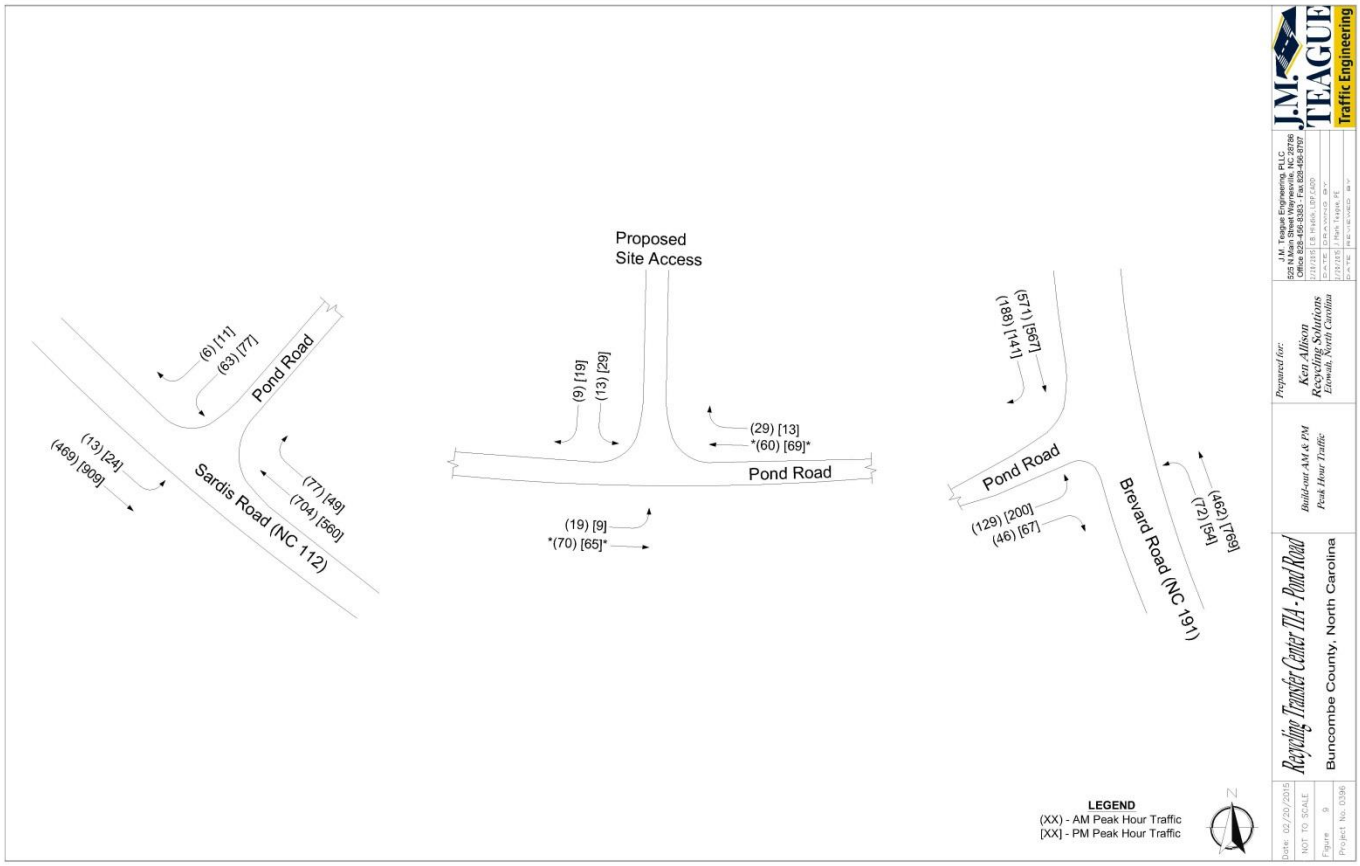



***FIGURE 8 – BUILD-OUT AM AND PM PEAK HOUR TRAFFIC***

## METHOD OF ANALYSIS

The studied intersections were analyzed using Synchro. Synchro is a specialized software package that allows the user to model intersections and roadway networks to determine levels of service (LOS), based on the thresholds specified in the Highway Capacity Manual (HCM) published by the Transportation Research Board. Synchro also provides analysis of capacity, vehicle delay, volume to capacity ratio (v/c), queue lengths, traffic signal timing, and vehicle flow rate. Existing and build-out conditions were analyzed for percent queue free, LOS, delay, and v/c ratio.

The HCM defines capacity as "the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point during a given time period under prevailing roadway, traffic, and control conditions". LOS is a term used to represent different driving conditions, primarily with respect to traffic congestion. It is defined as a "qualitative measure describing operational and perceptional conditions within a traffic stream". LOS "A" represents free flow traffic conditions with no congestion. LOS "F" represents severely impacted traffic flow due to vehicle congestion. LOS is generally determined by the total "Control Delay" experienced by drivers. Control delay is vehicle delay that is ultimately caused by the traffic control device. This includes deceleration delay, queue move-up time delay, stopped delay, and acceleration delay. (*Table 2)*

HIGHWAY CAPACITY MANUAL
LEVEL OF SERVICE AND DELAY

| UN-SIGNALIZED INTERSECTION | | SIGNALIZED INTERSECTION | |
|---|---|---|---|
| **LEVEL OF SERVICE** | **AVERAGE CONTROL DELAY PER VEHICLE (Seconds)** | **LEVEL OF SERVICE** | **AVERAGE CONTROL DELAY PER VEHICLE (Seconds)** |
| **A** | **0-10** | **A** | **0-10** |
| **B** | **10-15** | **B** | **10-15** |
| **C** | **15-25** | **C** | **15-25** |
| **D** | **25-35** | **D** | **25-35** |
| **E** | **35-50** | **E** | **35-80** |
| **F** | **> 50** | **F** | **> 80** |

*<Table 2>*

Usually, at a signalized intersection LOS "D" is considered the lowest acceptable LOS. However, it is not unusual for a side street or private driveway at an un-signalized intersection to experience LOS "F" during a peak hour. The analysis for un-signalized intersections can project very high delays on the side street, thus it is recommended to use LOS measurements as a comparative tool rather than a design tool. The volume to capacity ratio can also be an indication of roadway LOS. *(Table 3)*

| LEVEL OF SERVICE | V/C Ratio | PERCENT OF FREE FLOW SPEED (PEAK HOUR) |
|---|---|---|
| **A** | **0.50 AND BELOW** | **90% OR GREATER** |
| **B** | **0.60 TO 0.69** | **70% TO 90%** |
| **C** | **0.70 TO 0.79** | **50%** |
| **D** | **0.80 TO 0.89** | **40%** |
| **E** | **0.90 TO 0.99** | **33%** |
| **F** | **1.00 and Above** | **25% or less** |

*<Table 3>*

It can be seen as the v/c ratio approaches 1.0, the point where volume equals capacity, the LOS deteriorates dramatically.

The 95$^{th}$ Queue is defined to be the vehicle queue (back-up) that has only a 5% probability of being exceeded during the analysis period. At un-signalized intersections, p0 is the probability of a queue free state.

The proposed site access point on Pond Road was analyzed for available sight distance and needed sight distance at build-out using methodology outlined in the 2011 AASHTO (American Association of State Highway and Transportation Officials) "A Policy on Geometric Design of Highways and Structures" and as suggested by NCDOT. (AASHTO 2011: Case B1 – Left Turn from Stop).

## ANALYSIS OF EXISTING CONDITIONS

In order to estimate the current queue lengths, LOS and delay, and v/c ratios at the study intersections, the existing traffic volumes were analyzed using existing lane configurations and traffic control conditions *(Tables 4 – 5).* The capacity analysis (Synchro Reports) for the existing conditions can be found in *Appendix B.* The estimated delay was field verified and found to generally coincide with the Synchro calculations.

POND ROAD @ NC 191 (BREVARD ROAD)
ANALYSIS OF EXISTING AM/PM PEAK HOUR TRAFFIC CONDITIONS

| APPROACH | AM PEAK HOUR | | | PM PEAK HOUR | | |
|---|---|---|---|---|---|---|
| | 95th Queue Length (ft) | LOS and Delay (sec) | V/C Ratio | 95th Queue Length (ft) | LOS and Delay (sec) | V/C Ratio |
| Eastbound Left | 123 | D 40.4 | 0.61 | 166 | D 41.4 | 0.70 |
| Eastbound Right | 24 | C 29.7 | 0.03 | 25 | C 27.1 | 0.05 |
| Northbound Left | 24 | A 4.1 | 0.13 | 25 | A 5.2 | 0.11 |
| Northbound Thru | 72 | A 4.3 | 0.20 | 153 | A 6.4 | 0.34 |
| Southbound U-Turn | 6 | A 7.3 | 0.01 | 7 | A 8.8 | 0.01 |
| Southbound Thru | 137 | A 9.1 | 0.30 | 155 | B 11.0 | 0.32 |
| Southbound Right | 11 | A 3.7 | 0.12 | 10 | A 3.6 | 0.09 |

*<Table 4>*

POND ROAD @ NC 112 (SARDIS ROAD)
ANALYSIS OF EXISTING AM/PM PEAK HOUR TRAFFIC CONDITIONS

| APPROACH | AM PEAK HOUR | | | PM PEAK HOUR | | |
|---|---|---|---|---|---|---|
| | Queue Free (percent) | LOS and Delay (sec) | V/C Ratio | Queue Free (percent) | LOS and Delay (sec) | V/C Ratio |
| Westbound | 63 | E 38.5 | 0.39 | 33 | F 90.9 | 0.69 |
| Northbound | 100 | A 0.0 | 0.50 | 100 | A 0.0 | 0.39 |
| Southbound Left | 99 | A 9.6 | 0.01 | 97 | A 9.0 | 0.03 |
| Southbound Thru | 100 | A 0.0 | 0.31 | 100 | A 0.0 | 0.59 |

*<Table 5>*

## ANALYSIS OF BUILD-OUT TRAFFIC CONDITIONS

In order to estimate the build-out queue lengths, LOS and delay, and v/c ratios at the study intersections, the build-out traffic volumes were analyzed using the same lane configurations and traffic control conditions as existing conditions. *(Tables 6 – 7)*

POND ROAD @ NC 191 (BREVARD ROAD)
ANALYSIS OF BUILD-OUT AM/PM PEAK HOUR TRAFFIC CONDITIONS

| APPROACH | AM PEAK HOUR | | | PM PEAK HOUR | | |
|---|---|---|---|---|---|---|
| | 95th Queue Length (ft) | LOS and Delay (sec) | V/C Ratio | 95th Queue Length (ft) | LOS and Delay (sec) | V/C Ratio |
| Eastbound Left | 130 | D 41.5 | 0.65 | 180 | D 42.2 | 0.73 |
| Eastbound Right | 23 | C 28.9 | 0.04 | 25 | C 25.8 | 0.05 |
| Northbound Left | 29 | A 4.4 | 0.15 | 28 | A 5.8 | 0.12 |
| Northbound Thru | 76 | A 4.6 | 0.20 | 166 | A 7.1 | 0.36 |
| Southbound U-Turn | 6 | A 7.7 | 0.01 | 7 | A 9.6 | 0.01 |
| Southbound Thru | 145 | A 9.7 | 0.31 | 165 | B 12.0 | 0.33 |
| Southbound Right | 12 | A 3.8 | 0.14 | 10 | A 3.6 | 0.10 |

*<Table 6>*

POND ROAD @ NC 112 (SARDIS ROAD)
ANALYSIS OF BUILD-OUT AM/PM PEAK HOUR TRAFFIC CONDITIONS

| APPROACH | AM PEAK HOUR | | | PM PEAK HOUR | | |
|---|---|---|---|---|---|---|
| | Queue Free (percent) | LOS and Delay (sec) | V/C Ratio | Queue Free (percent) | LOS and Delay (sec) | V/C Ratio |
| Westbound | 55 | E 44.5 | 0.47 | 11 | F 139.7 | 0.92 |
| Northbound | 100 | A 0.0 | 0.51 | 100 | A 0.0 | 0.40 |
| Southbound Left | 98 | A 9.7 | 0.02 | 97 | A 9.0 | 0.03 |
| Southbound Thru | 100 | A 0.0 | 0.31 | 100 | A 0.0 | 0.59 |

*<Table 7>*

## CONCLUSIONS AND RECOMMENDATIONS

The mitigation recommendations were based on overall approach delay at the studied intersections utilizing NCDOT's *Policy on Street and Driveway Access to North Carolina Highways* (Driveway Manual) methodology and mitigation threshold requirements.

According to NCDOT guidelines, mitigation improvements should be required on the studied roadway network if at least one of the following conditions exists when comparing base network conditions to project build-out conditions:

- Average intersection or approach delay increases by 25% or greater while maintaining same LOS,
- LOS degrades by at least one level
- LOS is F

### *Pond Road @ NC 191 (Brevard Road):*

As can be seen in *Table 8*, the difference in LOS and delay between existing traffic and the anticipated trips generated by the project is only minimally increased for each approach during the AM and PM peak hours.

POND ROAD @ NC 191 (BREVARD ROAD)
COMPARISON OF EXISTING VS BUILD-OUT PEAK HOUR TRAFFIC CONDITIONS

| Approach | Peak Hour | Existing | | Build-out | | Delay Increase % |
|---|---|---|---|---|---|---|
| | | LOS | Delay | LOS | Delay | |
| Eastbound (Pond Road) | AM | D | 37.6 | D | 38.2 | 1.6% |
| | PM | D | 37.7 | D | 38.1 | 1.1 % |
| Northbound (NC 191) | AM | A | 4.2 | A | 4.6 | 9.5% |
| | PM | A | 6.3 | A | 7.1 | 12.7% |
| Southbound (NC 191) | AM | A | 7.9 | A | 8.2 | 3.8% |
| | PM | A | 9.6 | B | 10.3 | 7.3% |

*<Table 8>*

Based on the capacity analysis comparisons above, no approach exceeds the mitigation thresholds set forth by NCDOT. No mitigation is recommended for this intersection to accommodate traffic generated by the site. The addition of site generated traffic is not anticipated to degrade general roadway or driver safety at this intersection.

### *Pond Road @ NC 112 (Sardis Road):*

As can be seen in *Table 9* below, the difference in LOS and delay between existing traffic and the anticipated trips generated by the project exceeds the approach delay thresholds mentioned above during the PM peak hour for the westbound approach. It should be noted that although the delay increase percentage threshold is exceeded for the southbound approach during the AM peak hour, the overall delay increases by an insignificant 0.1 seconds, still a LOS A under build-out conditions.

POND ROAD @ PROPOSED SITE ACCESS
COMPARISON OF EXISTING VS BUILD-OUT PEAK HOUR TRAFFIC CONDITIONS

| Approach | Peak Hour | Existing | | Build-out | | Delay Increase % |
|---|---|---|---|---|---|---|
| | | LOS | Delay | LOS | Delay | |
| Westbound (*Pond Road*) | AM | E | 38.5 | E | 44.5 | 15.6% |
| | PM | F | 90.9 | F | 139.7 | 53.7% |
| Northbound (*NC 112*) | AM | A | 0.0 | A | 0.0 | 0% |
| | PM | A | 0.0 | A | 0.0 | 0% |
| Southbound (*NC 112*) | AM | A | 0.2 | A | 0.3 | 50% |
| | PM | A | 0.2 | A | 0.2 | 0% |

*<Table 9>*

In order to bring the delay increase percentage for the PM westbound approach to within NCDOT requirements (less than 25% increase) under build-out conditions, this intersection was modeled under several different scenarios, none of which decreased the mitigation threshold to NCDOT normally accepted levels. Mitigation scenarios included adding a westbound right turn lane on Pond Road, adding a westbound left turn lane on Pond Road, and adding a northbound right turn lane on NC 112. The intersection was also modeled as a fully actuated traffic signal, which did achieve the NCDOT recommended LOS threshold. However, operationally the intersection does not meet minimum traffic signal warrants as established by NCDOT and MUTCD (*Appendix C)*. Installing a traffic signal at an unwarranted intersection is ill advised and can create additional overall congestion, delay, and safety issues in order to improve vehicle delay for one particular movement.

Often, when an approach or movement reaches beyond a LOS F, the addition of even just a few vehicles will rapidly cause further degradation of the approach or movement. This is especially true for heavy commuter routes such as NC 112.

The primary reason for the current LOS F on the westbound approach is the significant volumes on NC 112 during the peak hours being opposed to a much lower volume of westbound Pond Road traffic. Throughout the rest of the day, local knowledge indicates that this intersection operates at an acceptable LOS. Because the intersection currently operates at a LOS F during the PM peak hour, no additional mitigation should be required by the developer.

### *Pond Road @ Proposed Site Access Point:*

As can be seen in *Table 10*, the resulting LOS, delay, v/c ratio, and queue are within acceptable levels for Pond Road @ Proposed Site Access. The southbound approach (proposed site access) is anticipated to operate at a LOS B during the AM peak hour and a LOS A during the AM peak hour.

POND ROAD @ PROPOSED SITE ACCESS
ANALYSIS OF BUILD-OUT AM/PM PEAK HOUR TRAFFIC CONDITIONS

| APPROACH | AM PEAK HOUR | | | PM PEAK HOUR | | |
|---|---|---|---|---|---|---|
| | **Queue Free (percent)** | **LOS and Delay (sec)** | **V/C Ratio** | **Queue Free (percent)** | **LOS and Delay (sec)** | **V/C Ratio** |
| Eastbound | 99 | A 1.7 | 0.01 | 99 | A 1.0 | 0.01 |
| Westbound | 100 | A 0.0 | 0.06 | 100 | A 0.0 | 0.05 |
| Southbound | 98 | B 10.1 | 0.03 | 96 | A 9.7 | 0.07 |

*<Table 10>*

In anticipation of the driveway permitting process, a sight distance study was performed for this proposed intersection. According to AASHTO, the required sight distance needs to be 390-feet based on 35 mph under "Case B1 – Left Turn from Stop". According to NCDOT, the required sight distance needs to be at least 350-feet based on a 35 mph speed. Based on the previously proposed site access location, the sight distance would be approximately 181-feet to the west and approximately 158-feet to the east.

Since the sight distance for the previous location of the proposed site access did not meet the minimum requirements set forth by AASHTO and NCDOT, the location of the proposed site access was relocated to the apex of an adjacent curve to the west. When this alternate site access is relocated, the available sight distance to the west is greater than 400-feet and around 300-feet to the east – much closer to meeting AASHTO and NCDOT requirements.

Although diligent efforts are being made to achieve adequate sight distance for the previously proposed and currently proposed site access locations, it is recommended that upon driveway completion, the previously stated AASHTO sight distance requirements be met. This will likely result in some additional vegetation removal and earthwork. It is recommended that clearing and grubbing occur on the south side of Pond Road within the vicinity of the currently proposed site access in order to achieve adequate sight distance requirements

## *Pond Road in General:*

In order to properly analyze the impact of additional site traffic from a potential development, nearby intersections are often the only sections of roadway analyzed. This is because intersections usually act as "choke points" and normally experience the brunt of safety and operational impacts from additional traffic. In addition to the previously identified intersections, Pond Road in general was reviewed for potential degradation due to the additional site traffic.

The increased traffic from the site is not expected to significantly add to the overall congestion or significantly degrade safety along Pond Road. Near the intersection of Pond Road @ NC 191 (Brevard Road), the current mix of Pond Road traffic is approximately 97% passenger vehicles / 3% heavy trucks during the AM peak hour and 98% passenger vehicles / 2% heavy trucks during the PM peak hour. Once the proposed development reaches full build-out conditions, the mix of Pond Road traffic near the intersection of Pond Road @ NC 191 (Brevard Road) is expected to consist of approximately 95% passenger vehicles / 5% heavy trucks during the AM peak hour and approximately 96% passenger vehicles / 4% heavy trucks during the PM peak hour.

The current mix of Pond Road traffic near the intersection of Pond Road @ NC 112 (Sardis Road) is 100% passenger vehicles / 0% heavy trucks during both the AM and PM peak hours. Under build-out conditions, the mix of Pond Road traffic near the intersection of Pond Road @ NC 112 (Sardis Road) is expected to consist of approximately 97% passenger vehicles / 3% heavy trucks during both the AM and PM peak hours.

The percentage increase in heavy truck traffic onto Pond Road under build-out conditions is not considered substantial when compared to the current mix of Pond Road traffic. The typical roadway width of Pond Road near the site is approximately 22-feet consisting of 11-foot wide travel lanes and an established unpaved shoulder. These geometrics should be adequate to handle additional traffic generated by the site.

# Appendix A

## TURNING MOVEMENT COUNTS

# J. M. Teague Engineering, PLLC

525 North Main Street, Waynesville, NC
(828) 456-8383

Serial Number: TU 1059
Count By: J. Alchevsky
Weather: 20s (AM), 40s (PM) clear
School in Session: Confirmed

File Name : Pond Rd @ NC 191- Existing
Site Code : 02052115
Start Date : 2/5/2015
Page No : 1

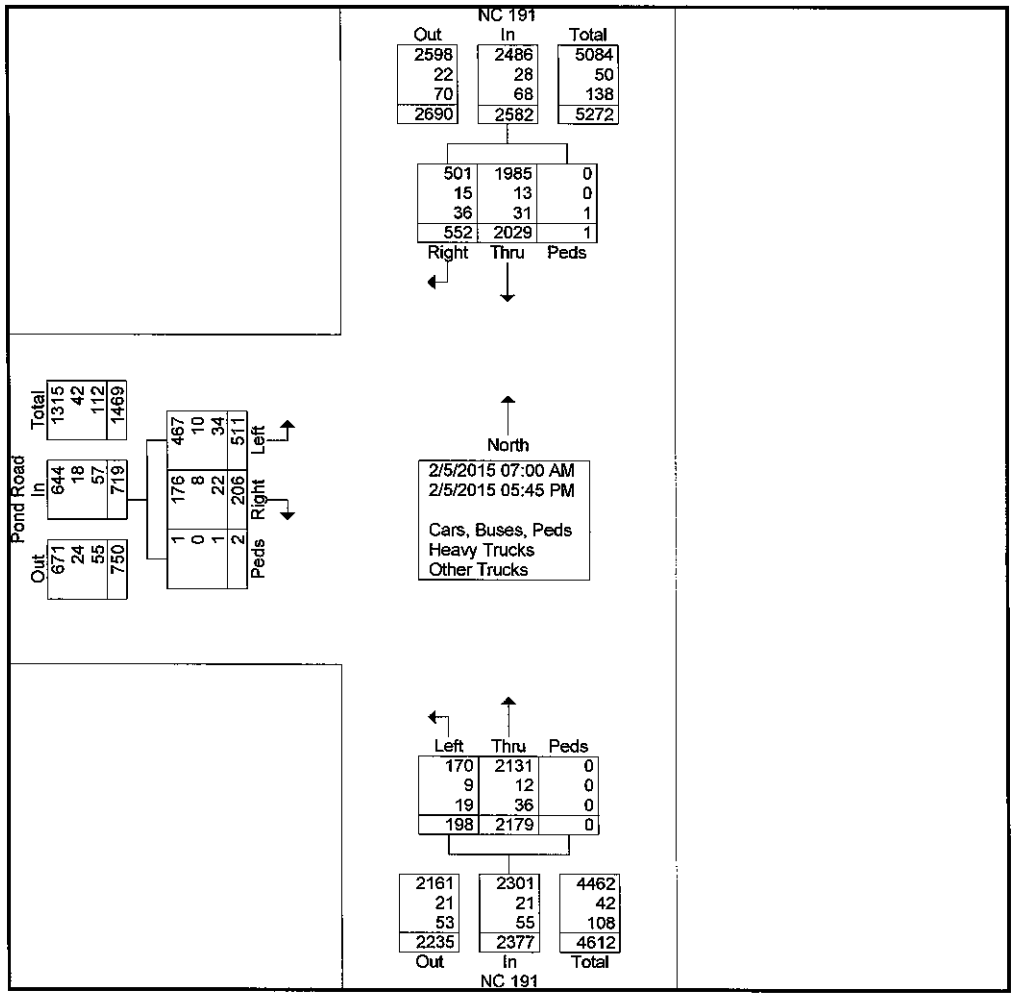
**Groups Printed- Cars, Buses, Peds - Heavy Trucks - Other Trucks**

| | NC 191 Southbound | | | | NC 191 Northbound | | | | Pond Road Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Thru | Right | Peds | App. Total | Left | Thru | Peds | App. Total | Left | Right | Peds | App. Total | Int. Total |
| Factor | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | | |
| 07:00 AM | 78 | 31 | 0 | 109 | 9 | 57 | 0 | 66 | 20 | 10 | 0 | 30 | 205 |
| 07:15 AM | 90 | 42 | 0 | 132 | 9 | 96 | 0 | 105 | 25 | 10 | 0 | 35 | 272 |
| 07:30 AM | 129 | 38 | 0 | 167 | 14 | 108 | 0 | 122 | 29 | 5 | 0 | 34 | 323 |
| 07:45 AM | 149 | 55 | 0 | 204 | 18 | 127 | 0 | 145 | 28 | 7 | 0 | 35 | 384 |
| Total | 446 | 166 | 0 | 612 | 50 | 388 | 0 | 438 | 102 | 32 | 0 | 134 | 1184 |
| 08:00 AM | 169 | 47 | 0 | 216 | 20 | 124 | 0 | 144 | 31 | 16 | 0 | 47 | 407 |
| 08:15 AM | 124 | 28 | 0 | 152 | 11 | 103 | 0 | 114 | 31 | 15 | 0 | 46 | 312 |
| 08:30 AM | 138 | 28 | 0 | 166 | 13 | 74 | 0 | 87 | 16 | 13 | 0 | 29 | 282 |
| 08:45 AM | 111 | 40 | 0 | 151 | 18 | 108 | 0 | 126 | 30 | 9 | 0 | 39 | 316 |
| Total | 542 | 143 | 0 | 685 | 62 | 409 | 0 | 471 | 108 | 53 | 0 | 161 | 1317 |
| *** BREAK *** | | | | | | | | | | | | | |
| 04:00 PM | 119 | 29 | 0 | 148 | 9 | 129 | 0 | 138 | 30 | 11 | 0 | 41 | 327 |
| 04:15 PM | 105 | 36 | 1 | 142 | 4 | 153 | 0 | 157 | 27 | 15 | 0 | 42 | 341 |
| 04:30 PM | 129 | 21 | 0 | 150 | 13 | 165 | 0 | 178 | 37 | 21 | 0 | 58 | 386 |
| 04:45 PM | 138 | 29 | 0 | 167 | 16 | 171 | 0 | 187 | 36 | 9 | 0 | 45 | 399 |
| Total | 491 | 115 | 1 | 607 | 42 | 618 | 0 | 660 | 130 | 56 | 0 | 186 | 1453 |
| 05:00 PM | 134 | 35 | 0 | 169 | 9 | 165 | 0 | 174 | 56 | 17 | 1 | 74 | 417 |
| 05:15 PM | 148 | 35 | 0 | 183 | 14 | 220 | 0 | 234 | 45 | 13 | 1 | 59 | 476 |
| 05:30 PM | 147 | 33 | 0 | 180 | 11 | 213 | 0 | 224 | 41 | 21 | 0 | 62 | 466 |
| 05:45 PM | 121 | 25 | 0 | 146 | 10 | 166 | 0 | 176 | 29 | 14 | 0 | 43 | 365 |
| Total | 550 | 128 | 0 | 678 | 44 | 764 | 0 | 808 | 171 | 65 | 2 | 238 | 1724 |
| Grand Total | 2029 | 552 | 1 | 2582 | 198 | 2179 | 0 | 2377 | 511 | 206 | 2 | 719 | 5678 |
| Apprch % | 78.6 | 21.4 | 0 | | 8.3 | 91.7 | 0 | | 71.1 | 28.7 | 0.3 | | |
| Total % | 35.7 | 9.7 | 0 | 45.5 | 3.5 | 38.4 | 0 | 41.9 | 9 | 3.6 | 0 | 12.7 | |
| Cars, Buses, Peds | 1985 | 501 | 0 | 2486 | 170 | 2131 | 0 | 2301 | 467 | 176 | 1 | 644 | 5431 |
| % Cars, Buses, Peds | 97.8 | 90.8 | 0 | 96.3 | 85.9 | 97.8 | 0 | 96.8 | 91.4 | 85.4 | 50 | 89.6 | 95.6 |
| Heavy Trucks | 13 | 15 | 0 | 28 | 9 | 12 | 0 | 21 | 10 | 8 | 0 | 18 | 67 |
| % Heavy Trucks | 0.6 | 2.7 | 0 | 1.1 | 4.5 | 0.6 | 0 | 0.9 | 2 | 3.9 | 0 | 2.5 | 1.2 |
| Other Trucks | 31 | 36 | 1 | 68 | 19 | 36 | 0 | 55 | 34 | 22 | 1 | 57 | 180 |
| % Other Trucks | 1.5 | 6.5 | 100 | 2.6 | 9.6 | 1.7 | 0 | 2.3 | 6.7 | 10.7 | 50 | 7.9 | 3.2 |

# J. M. Teague Engineering, PLLC

525 North Main Street, Waynesville, NC
(828) 456-8383

File Name : Pond Rd @ NC 191- Existing
Site Code : 02052115
Start Date : 2/5/2015
Page No : 2



# J. M. Teague Engineering, PLLC

525 North Main Street, Waynesville, NC
(828) 456-8383

File Name : Pond Rd @ NC 191- Existing
Site Code : 02052115
Start Date : 2/5/2015
Page No : 3

| | NC 191 Southbound | | | | NC 191 Northbound | | | | Pond Road Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Thru | Right | Peds | App. Total | Left | Thru | Peds | App. Total | Left | Right | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1 | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:30 AM | | | | | | | | | | | | | |
| 07:30 AM | 129 | 38 | 0 | 167 | 14 | 108 | 0 | 122 | 29 | 5 | 0 | 34 | 323 |
| 07:45 AM | 149 | **55** | 0 | 204 | 18 | **127** | 0 | **145** | 28 | 7 | 0 | 35 | 384 |
| 08:00 AM | **169** | 47 | 0 | **216** | **20** | 124 | 0 | 144 | **31** | **16** | 0 | **47** | **407** |
| 08:15 AM | 124 | 28 | 0 | 152 | 11 | 103 | 0 | 114 | 31 | 15 | 0 | 46 | 312 |
| Total Volume | 571 | 168 | 0 | 739 | 63 | 462 | 0 | 525 | 119 | 43 | 0 | 162 | 1426 |
| % App. Total | 77.3 | 22.7 | 0 | | 12 | 88 | 0 | | 73.5 | 26.5 | 0 | | |
| PHF | .845 | .764 | .000 | .855 | .788 | .909 | .000 | .905 | .960 | .672 | .000 | .862 | .876 |
| Cars, Buses, Peds | 561 | 149 | 0 | 710 | 56 | 443 | 0 | 499 | 107 | 36 | 0 | 143 | 1352 |
| % Cars, Buses, Peds | 98.2 | 88.7 | 0 | 96.1 | 88.9 | 95.9 | 0 | 95.0 | 89.9 | 83.7 | 0 | 88.3 | 94.8 |
| Heavy Trucks | 2 | 7 | 0 | 9 | 2 | 5 | 0 | 7 | 2 | 1 | 0 | 3 | 19 |
| % Heavy Trucks | 0.4 | 4.2 | 0 | 1.2 | 3.2 | 1.1 | 0 | 1.3 | 1.7 | 2.3 | 0 | 1.9 | 1.3 |
| Other Trucks | 8 | 12 | 0 | 20 | 5 | 14 | 0 | 19 | 10 | 6 | 0 | 16 | 55 |
| % Other Trucks | 1.4 | 7.1 | 0 | 2.7 | 7.9 | 3.0 | 0 | 3.6 | 8.4 | 14.0 | 0 | 9.9 | 3.9 |

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File Name : Pond Rd @ NC 191- Existing
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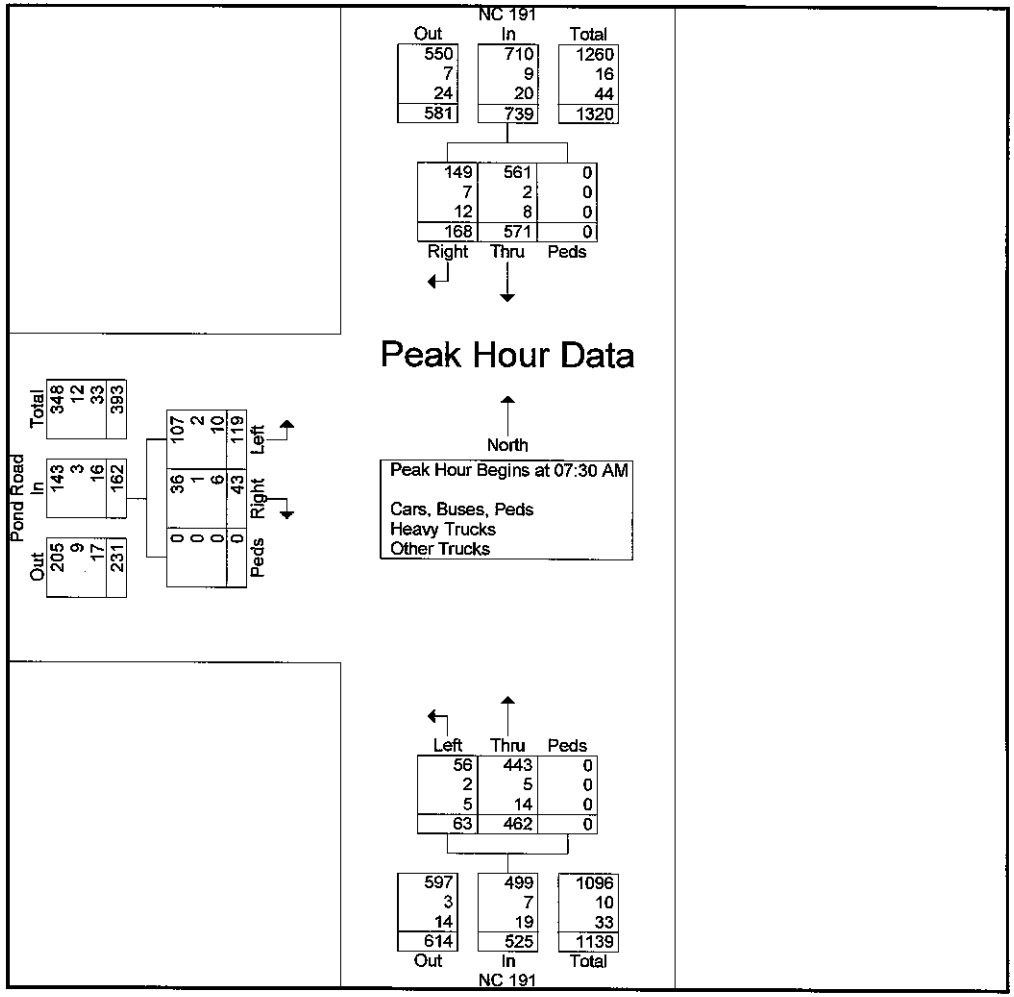
Start Date : 2/5/2015
Page No : 4



# J. M. Teague Engineering, PLLC

525 North Main Street, Waynesville, NC
(828) 456-8383

File Name : Pond Rd @ NC 191- Existing
Site Code : 02052115
Start Date : 2/5/2015
Page No : 5

| | NC 191 Southbound | | | | NC 191 Northbound | | | | Pond Road Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Thru | Right | Peds | App. Total | Left | Thru | Peds | App. Total | Left | Right | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:45 PM | | | | | | | | | | | | | |
| 04:45 PM | 138 | 29 | 0 | 167 | **16** | 171 | 0 | 187 | 36 | 9 | 0 | 45 | 399 |
| 05:00 PM | 134 | **35** | 0 | 169 | 9 | 165 | 0 | 174 | **56** | 17 | 1 | **74** | 417 |
| 05:15 PM | **148** | 35 | 0 | **183** | 14 | **220** | 0 | **234** | **45** | 13 | 1 | 59 | **476** |
| 05:30 PM | 147 | 33 | 0 | 180 | 11 | 213 | 0 | 224 | 41 | **21** | 0 | 62 | 466 |
| Total Volume | 567 | 132 | 0 | 699 | 50 | 769 | 0 | 819 | 178 | 60 | 2 | 240 | 1758 |
| % App. Total | 81.1 | 18.9 | 0 | | 6.1 | 93.9 | 0 | | 74.2 | 25 | 0.8 | | |
| PHF | .958 | .943 | .000 | .955 | .781 | .874 | .000 | .875 | .795 | .714 | .500 | .811 | .923 |
| Cars, Buses, Peds | 557 | 123 | 0 | 680 | 43 | 761 | 0 | 804 | 169 | 56 | 1 | 226 | 1710 |
| % Cars, Buses, Peds | 98.2 | 93.2 | 0 | 97.3 | 86.0 | 99.0 | 0 | 98.2 | 94.9 | 93.3 | 50.0 | 94.2 | 97.3 |
| Heavy Trucks | 3 | 1 | 0 | 4 | 2 | 3 | 0 | 5 | 3 | 3 | 0 | 6 | 15 |
| % Heavy Trucks | 0.5 | 0.8 | 0 | 0.6 | 4.0 | 0.4 | 0 | 0.6 | 1.7 | 5.0 | 0 | 2.5 | 0.9 |
| Other Trucks | 7 | 8 | 0 | 15 | 5 | 5 | 0 | 10 | 6 | 1 | 1 | 8 | 33 |
| % Other Trucks | 1.2 | 6.1 | 0 | 2.1 | 10.0 | 0.7 | 0 | 1.2 | 3.4 | 1.7 | 50.0 | 3.3 | 1.9 |

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525 North Main Street, Waynesville, NC
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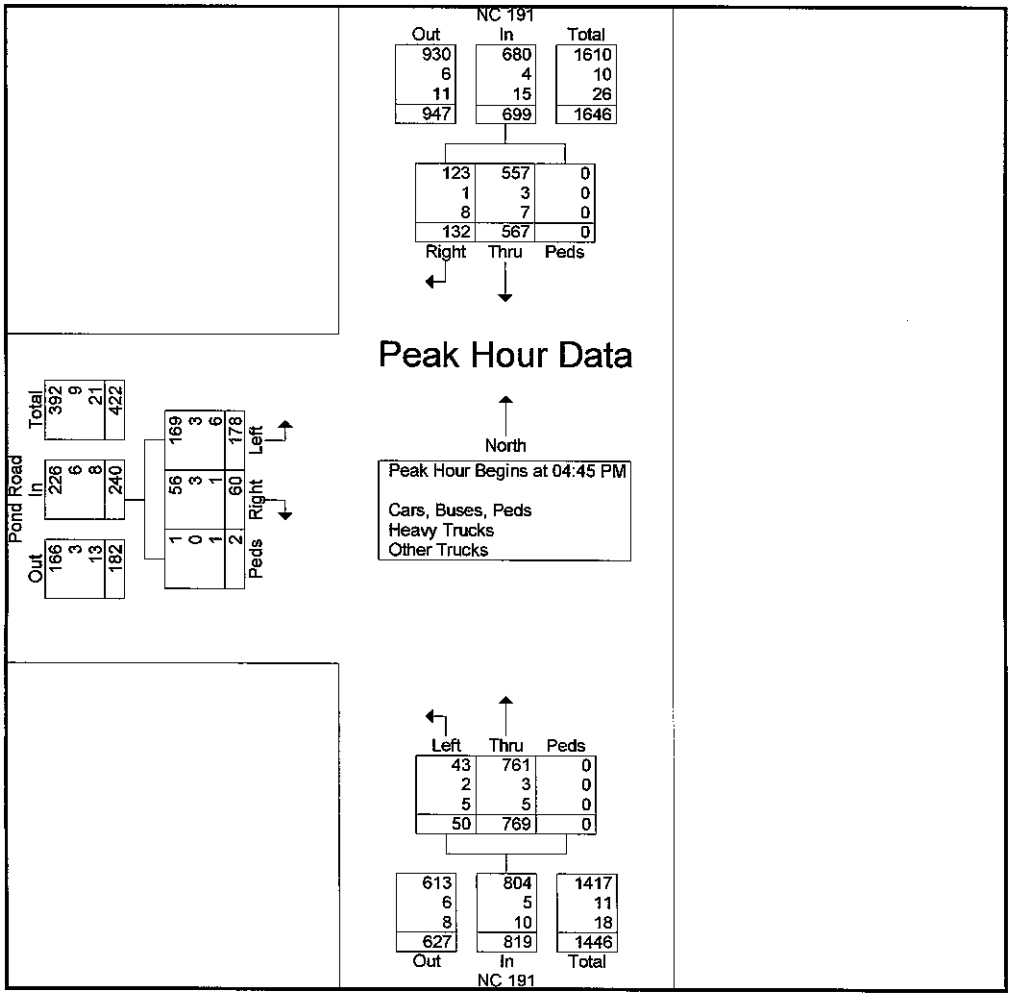
File Name : Pond Rd @ NC 191- Existing
Site Code : 02052115
Start Date : 2/5/2015
Page No : 6



# J. M. Teague Engineering, PLLC

525 North Main Street, Waynesville, NC
(828) 456-8383

Serial Number: TU- 1059
Count By: J. Alchevsky
Weather: 20s (AM), 40s (PM), clear
School in Session: Confirmed

File Name : Pond Rd @ NC 112- Existing
Site Code : 02042015
Start Date : 2/4/2015
Page No : 1

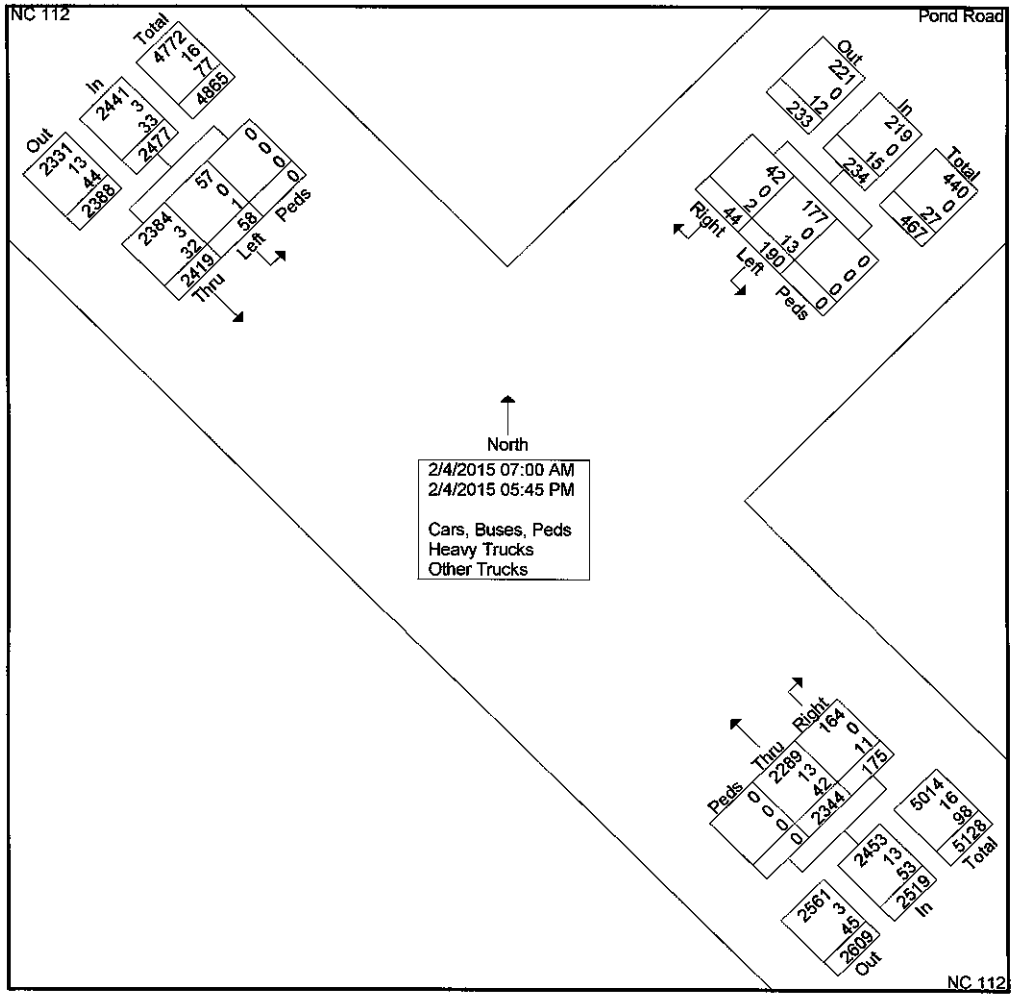
**Groups Printed- Cars, Buses, Peds - Heavy Trucks - Other Trucks**

| | Pond Road Southwestbound | | | | NC 112 Southeastbound | | | | NC 112 Northwestbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Right | Peds | App. Total | Left | Thru | Peds | App. Total | Thru | Right | Peds | App. Total | Int. Total |
| Factor | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | | |
| 07:00 AM | 7 | 3 | 0 | 10 | 0 | 66 | 0 | 66 | 124 | 5 | 0 | 129 | 205 |
| 07:15 AM | 11 | 3 | 0 | 14 | 0 | 85 | 0 | 85 | 149 | 10 | 0 | 159 | 258 |
| 07:30 AM | 12 | 0 | 0 | 12 | 2 | 107 | 0 | 109 | 174 | 19 | 0 | 193 | 314 |
| 07:45 AM | 18 | 3 | 0 | 21 | 3 | 123 | 0 | 126 | 188 | 20 | 0 | 208 | 355 |
| Total | 48 | 9 | 0 | 57 | 5 | 381 | 0 | 386 | 635 | 54 | 0 | 689 | 1132 |
| 08:00 AM | 17 | 0 | 0 | 17 | 1 | 145 | 0 | 146 | 182 | 10 | 0 | 192 | 355 |
| 08:15 AM | 8 | 2 | 0 | 10 | 2 | 94 | 0 | 96 | 160 | 14 | 0 | 174 | 280 |
| 08:30 AM | 7 | 9 | 0 | 16 | 1 | 92 | 0 | 93 | 158 | 9 | 0 | 167 | 276 |
| 08:45 AM | 6 | 2 | 0 | 8 | 1 | 73 | 0 | 74 | 136 | 8 | 0 | 144 | 226 |
| Total | 38 | 13 | 0 | 51 | 5 | 404 | 0 | 409 | 636 | 41 | 0 | 677 | 1137 |
| *** BREAK *** | | | | | | | | | | | | | |
| 04:00 PM | 11 | 3 | 0 | 14 | 10 | 148 | 0 | 158 | 146 | 12 | 0 | 158 | 330 |
| 04:15 PM | 12 | 2 | 0 | 14 | 5 | 197 | 0 | 202 | 114 | 12 | 0 | 126 | 342 |
| 04:30 PM | 12 | 3 | 0 | 15 | 5 | 183 | 0 | 188 | 130 | 8 | 0 | 138 | 341 |
| 04:45 PM | 9 | 5 | 0 | 14 | 6 | 197 | 0 | 203 | 123 | 6 | 0 | 129 | 346 |
| Total | 44 | 13 | 0 | 57 | 26 | 725 | 0 | 751 | 513 | 38 | 0 | 551 | 1359 |
| 05:00 PM | 16 | 5 | 0 | 21 | 8 | 244 | 0 | 252 | 135 | 11 | 0 | 146 | 419 |
| 05:15 PM | 21 | 2 | 0 | 23 | 2 | 228 | 0 | 230 | 145 | 10 | 0 | 155 | 408 |
| 05:30 PM | 12 | 0 | 0 | 12 | 8 | 220 | 0 | 228 | 151 | 13 | 0 | 164 | 404 |
| 05:45 PM | 11 | 2 | 0 | 13 | 4 | 217 | 0 | 221 | 129 | 8 | 0 | 137 | 371 |
| Total | 60 | 9 | 0 | 69 | 22 | 909 | 0 | 931 | 560 | 42 | 0 | 602 | 1602 |
| Grand Total | 190 | 44 | 0 | 234 | 58 | 2419 | 0 | 2477 | 2344 | 175 | 0 | 2519 | 5230 |
| Apprch % | 81.2 | 18.8 | 0 | | 2.3 | 97.7 | 0 | | 93.1 | 6.9 | 0 | | |
| Total % | 3.6 | 0.8 | 0 | 4.5 | 1.1 | 46.3 | 0 | 47.4 | 44.8 | 3.3 | 0 | 48.2 | |
| Cars, Buses, Peds | 177 | 42 | 0 | 219 | 57 | 2384 | 0 | 2441 | 2289 | 164 | 0 | 2453 | 5113 |
| % Cars, Buses, Peds | 93.2 | 95.5 | 0 | 93.6 | 98.3 | 98.6 | 0 | 98.5 | 97.7 | 93.7 | 0 | 97.4 | 97.8 |
| Heavy Trucks | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 13 | 0 | 0 | 13 | 16 |
| % Heavy Trucks | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0.1 | 0.6 | 0 | 0 | 0.5 | 0.3 |
| Other Trucks | 13 | 2 | 0 | 15 | 1 | 32 | 0 | 33 | 42 | 11 | 0 | 53 | 101 |
| % Other Trucks | 6.8 | 4.5 | 0 | 6.4 | 1.7 | 1.3 | 0 | 1.3 | 1.8 | 6.3 | 0 | 2.1 | 1.9 |

# J. M. Teague Engineering, PLLC

525 North Main Street, Waynesville, NC
(828) 456-8383

File Name : Pond Rd @ NC 112- Existing
Site Code : 02042015
Start Date : 2/4/2015
Page No : 2



# J. M. Teague Engineering, PLLC

525 North Main Street, Waynesville, NC
(828) 456-8383

File Name : Pond Rd @ NC 112- Existing
Site Code : 02042015
Start Date : 2/4/2015
Page No : 3

| | Pond Road Southwestbound | | | | NC 112 Southeastbound | | | | NC 112 Northwestbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Right | Peds | App. Total | Left | Thru | Peds | App. Total | Thru | Right | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1 | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:30 AM | | | | | | | | | | | | | |
| 07:30 AM | 12 | 0 | 0 | 12 | 2 | 107 | 0 | 109 | 174 | 19 | 0 | 193 | 314 |
| 07:45 AM | **18** | **3** | 0 | **21** | **3** | 123 | 0 | 126 | **188** | **20** | 0 | **208** | **355** |
| 08:00 AM | 17 | 0 | 0 | 17 | 1 | **145** | 0 | **146** | 182 | 10 | 0 | 192 | 355 |
| 08:15 AM | 8 | 2 | 0 | 10 | 2 | 94 | 0 | 96 | 160 | 14 | 0 | 174 | 280 |
| Total Volume | 55 | 5 | 0 | 60 | 8 | 469 | 0 | 477 | 704 | 63 | 0 | 767 | 1304 |
| % App. Total | 91.7 | 8.3 | 0 | | 1.7 | 98.3 | 0 | | 91.8 | 8.2 | 0 | | |
| PHF | .764 | .417 | .000 | .714 | .667 | .809 | .000 | .817 | .936 | .788 | .000 | .922 | .918 |
| Cars, Buses, Peds | 50 | 4 | 0 | 54 | 8 | 459 | 0 | 467 | 683 | 62 | 0 | 745 | 1266 |
| % Cars, Buses, Peds | 90.9 | 80.0 | 0 | 90.0 | 100 | 97.9 | 0 | 97.9 | 97.0 | 98.4 | 0 | 97.1 | 97.1 |
| Heavy Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 5 |
| % Heavy Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0.7 | 0.4 |
| Other Trucks | 5 | 1 | 0 | 6 | 0 | 10 | 0 | 10 | 16 | 1 | 0 | 17 | 33 |
| % Other Trucks | 9.1 | 20.0 | 0 | 10.0 | 0 | 2.1 | 0 | 2.1 | 2.3 | 1.6 | 0 | 2.2 | 2.5 |

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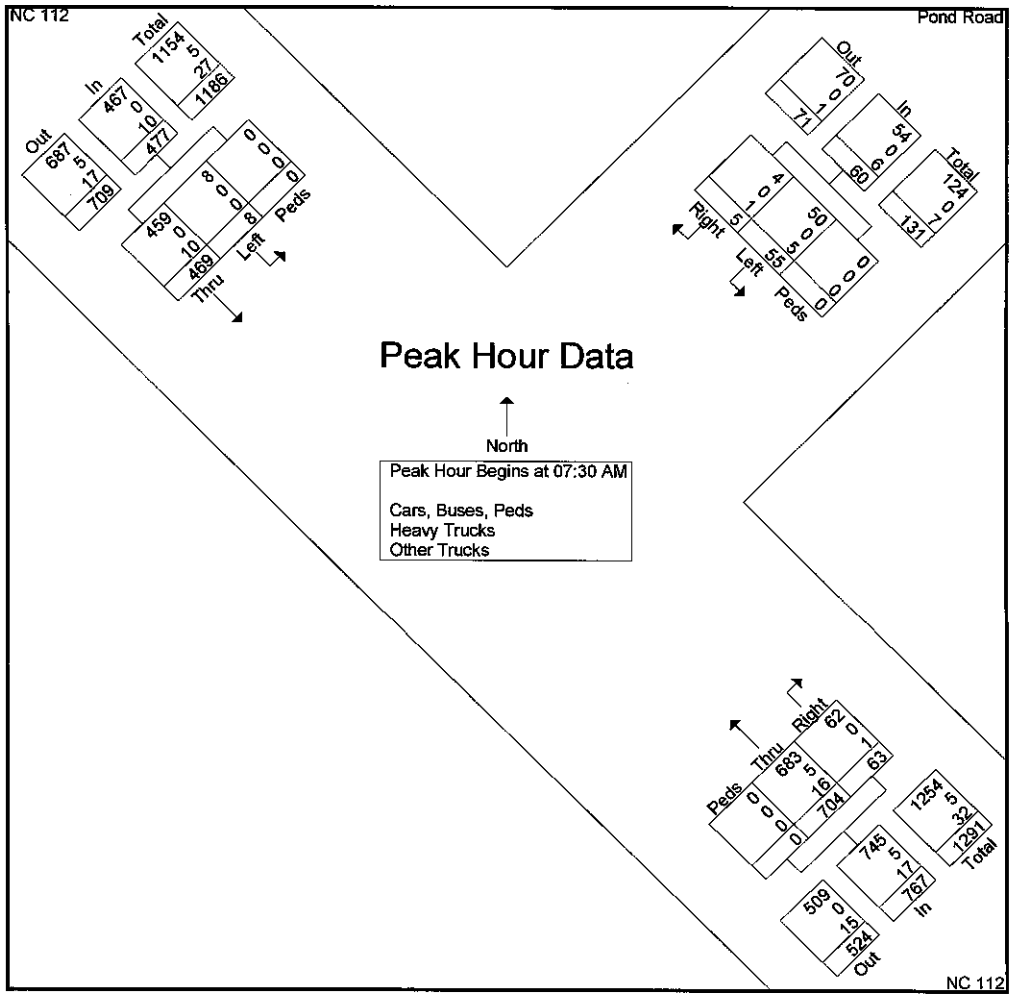
File Name : Pond Rd @ NC 112- Existing
Site Code : 02042015
Start Date : 2/4/2015
Page No : 4



# J. M. Teague Engineering, PLLC

525 North Main Street, Waynesville, NC
(828) 456-8383

File Name : Pond Rd @ NC 112- Existing
Site Code : 02042015
Start Date : 2/4/2015
Page No : 5

| | Pond Road Southwestbound | | | | NC 112 Southeastbound | | | | NC 112 Northwestbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Right | Peds | App. Total | Left | Thru | Peds | App. Total | Thru | Right | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 05:00 PM | | | | | | | | | | | | | |
| 05:00 PM | 16 | **5** | 0 | 21 | **8** | **244** | 0 | **252** | 135 | 11 | 0 | 146 | **419** |
| 05:15 PM | **21** | 2 | 0 | **23** | 2 | 228 | 0 | 230 | 145 | 10 | 0 | 155 | 408 |
| 05:30 PM | 12 | 0 | 0 | 12 | 8 | 220 | 0 | 228 | **151** | **13** | 0 | **164** | 404 |
| 05:45 PM | 11 | 2 | 0 | 13 | 4 | 217 | 0 | 221 | 129 | 8 | 0 | 137 | 371 |
| Total Volume | 60 | 9 | 0 | 69 | 22 | 909 | 0 | 931 | 560 | 42 | 0 | 602 | 1602 |
| % App. Total | 87 | 13 | 0 | | 2.4 | 97.6 | 0 | | 93 | 7 | 0 | | |
| PHF | .714 | .450 | .000 | .750 | .688 | .931 | .000 | .924 | .927 | .808 | .000 | .918 | .956 |
| Cars, Buses, Peds | 60 | 9 | 0 | 69 | 22 | 903 | 0 | 925 | 552 | 40 | 0 | 592 | 1586 |
| % Cars, Buses, Peds | 100 | 100 | 0 | 100 | 100 | 99.3 | 0 | 99.4 | 98.6 | 95.2 | 0 | 98.3 | 99.0 |
| Heavy Trucks | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 0 | 2 | 3 |
| % Heavy Trucks | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0.1 | 0.4 | 0 | 0 | 0.3 | 0.2 |
| Other Trucks | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 5 | 6 | 2 | 0 | 8 | 13 |
| % Other Trucks | 0 | 0 | 0 | 0 | 0 | 0.6 | 0 | 0.5 | 1.1 | 4.8 | 0 | 1.3 | 0.8 |

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File Name : Pond Rd @ NC 112- Existing
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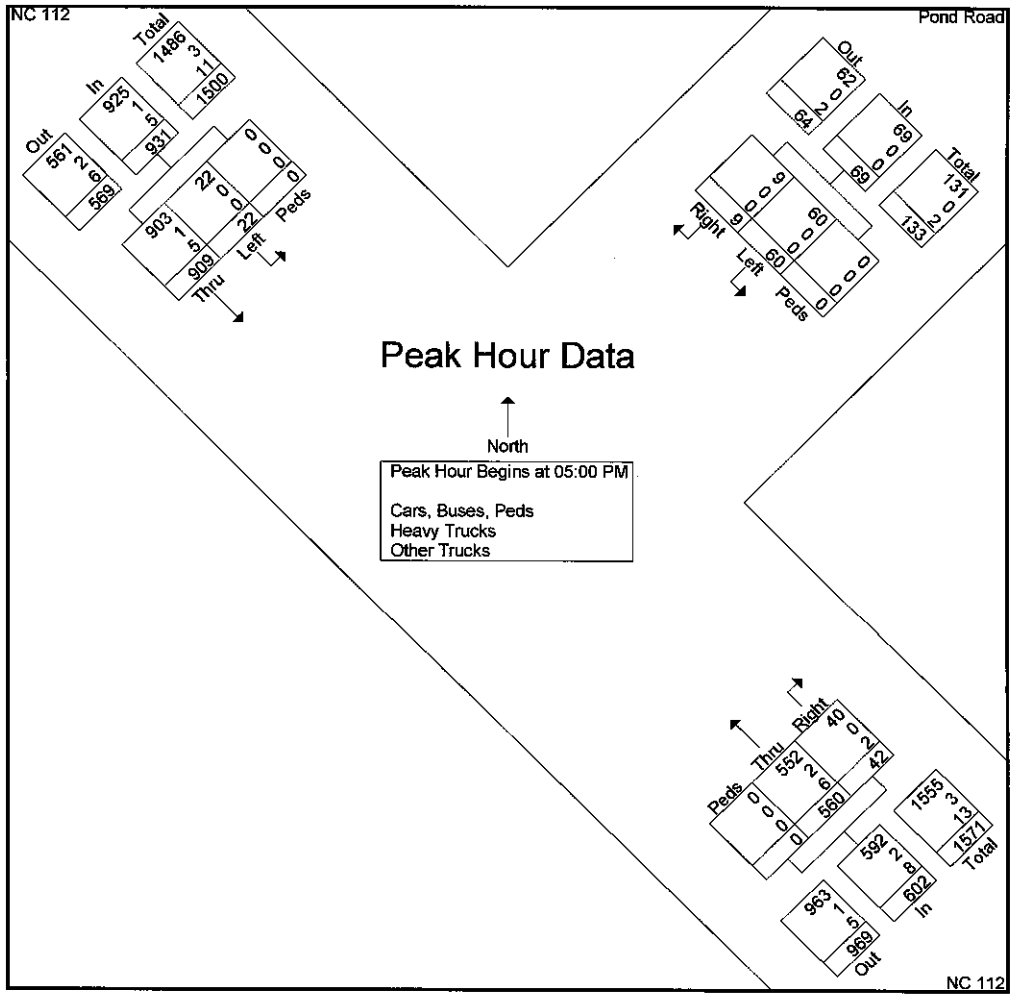


# Appendix B

## INTERSECTION ANALYSIS REPORTS

| Movement | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Volume (vph) | 119 | 43 | 63 | 462 | 4 | 571 | 168 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Grade (%) | 8% | | | -4% | | 3% | |
| Total Lost time (s) | 6.7 | 5.8 | 5.8 | 7.0 | 6.4 | 6.4 | 6.7 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 |
| Frt | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1699 | 1520 | 1787 | 3646 | 1778 | 3521 | 1530 |
| Flt Permitted | 0.95 | 1.00 | 0.36 | 1.00 | 0.46 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1699 | 1520 | 674 | 3646 | 866 | 3521 | 1530 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 132 | 48 | 70 | 513 | 4 | 634 | 187 |
| RTOR Reduction (vph) | 0 | 39 | 0 | 0 | 0 | 0 | 51 |
| Lane Group Flow (vph) | 132 | 9 | 70 | 513 | 4 | 634 | 136 |
| Heavy Vehicles (%) | 2% | 2% | 3% | 1% | 0% | 1% | 4% |
| Turn Type | | pm+ov | pm+pt | | Perm | | pm+ov |
| Protected Phases | 4 | 5 | 5 | 2 | | 6 | 4 |
| Permitted Phases | | 4 | 2 | | 6 | | 6 |
| Actuated Green, G (s) | 11.5 | 17.1 | 64.8 | 64.8 | 54.0 | 54.0 | 65.5 |
| Effective Green, g (s) | 11.5 | 17.1 | 64.8 | 64.8 | 54.0 | 54.0 | 65.5 |
| Actuated g/C Ratio | 0.13 | 0.19 | 0.72 | 0.72 | 0.60 | 0.60 | 0.73 |
| Clearance Time (s) | 6.7 | 5.8 | 5.8 | 7.0 | 6.4 | 6.4 | 6.7 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 6.0 | 6.0 | 6.0 | 2.0 |
| Lane Grp Cap (vph) | 217 | 289 | 555 | 2625 | 520 | 2113 | 1114 |
| v/s Ratio Prot | c0.08 | 0.00 | 0.01 | c0.14 | | c0.18 | 0.02 |
| v/s Ratio Perm | | 0.00 | 0.08 | | 0.00 | | 0.07 |
| v/c Ratio | 0.61 | 0.03 | 0.13 | 0.20 | 0.01 | 0.30 | 0.12 |
| Uniform Delay, d1 | 37.1 | 29.7 | 4.0 | 4.1 | 7.2 | 8.8 | 3.7 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 3.3 | 0.0 | 0.0 | 0.2 | 0.0 | 0.4 | 0.0 |
| Delay (s) | 40.4 | 29.7 | 4.1 | 4.3 | 7.3 | 9.1 | 3.7 |
| Level of Service | D | C | A | A | A | A | A |
| Approach Delay (s) | 37.6 | | | 4.2 | | 7.9 | |
| Approach LOS | D | | | A | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 9.9 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.36 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 20.1 |
| Intersection Capacity Utilization | 47.8% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Lane Group | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 132 | 48 | 70 | 513 | 4 | 634 | 187 |
| v/c Ratio | 0.61 | 0.10 | 0.12 | 0.20 | 0.01 | 0.29 | 0.14 |
| Control Delay | 48.5 | 7.2 | 4.5 | 4.7 | 9.5 | 9.8 | 0.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.5 | 7.2 | 4.5 | 4.7 | 9.5 | 9.8 | 0.6 |
| Queue Length 50th (ft) | 72 | 0 | 9 | 41 | 1 | 88 | 0 |
| Queue Length 95th (ft) | 123 | 24 | 24 | 72 | 6 | 137 | 11 |
| Internal Link Dist (ft) | 553 | | | 607 | | 615 | |
| Turn Bay Length (ft) | | 100 | 250 | | 250 | | 200 |
| Base Capacity (vph) | 402 | 512 | 620 | 2626 | 531 | 2159 | 1401 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.33 | 0.09 | 0.11 | 0.20 | 0.01 | 0.29 | 0.13 |

Intersection Summary

| Movement | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Volume (vph) | 178 | 60 | 50 | 769 | 4 | 567 | 132 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Grade (%) | 8% | | | -4% | | 3% | |
| Total Lost time (s) | 6.7 | 5.8 | 5.8 | 7.0 | 6.4 | 6.4 | 6.7 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 |
| Frt | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1699 | 1477 | 1770 | 3646 | 1778 | 3521 | 1575 |
| Flt Permitted | 0.95 | 1.00 | 0.35 | 1.00 | 0.33 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1699 | 1477 | 654 | 3646 | 620 | 3521 | 1575 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 198 | 67 | 56 | 854 | 4 | 630 | 147 |
| RTOR Reduction (vph) | 0 | 52 | 0 | 0 | 0 | 0 | 40 |
| Lane Group Flow (vph) | 198 | 15 | 56 | 854 | 4 | 630 | 107 |
| Heavy Vehicles (%) | 2% | 5% | 4% | 1% | 0% | 1% | 1% |
| Turn Type | | pm+ov | pm+pt | | Perm | | pm+ov |
| Protected Phases | 4 | 5 | 5 | 2 | | 6 | 4 |
| Permitted Phases | | 4 | 2 | | 6 | | 6 |
| Actuated Green, G (s) | 15.0 | 20.6 | 61.3 | 61.3 | 50.5 | 50.5 | 65.5 |
| Effective Green, g (s) | 15.0 | 20.6 | 61.3 | 61.3 | 50.5 | 50.5 | 65.5 |
| Actuated g/C Ratio | 0.17 | 0.23 | 0.68 | 0.68 | 0.56 | 0.56 | 0.73 |
| Clearance Time (s) | 6.7 | 5.8 | 5.8 | 7.0 | 6.4 | 6.4 | 6.7 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 6.0 | 6.0 | 6.0 | 2.0 |
| Lane Grp Cap (vph) | 283 | 338 | 515 | 2483 | 348 | 1976 | 1146 |
| v/s Ratio Prot | c0.12 | 0.00 | 0.01 | c0.23 | | 0.18 | 0.02 |
| v/s Ratio Perm | | 0.01 | 0.07 | | 0.01 | | 0.05 |
| v/c Ratio | 0.70 | 0.05 | 0.11 | 0.34 | 0.01 | 0.32 | 0.09 |
| Uniform Delay, d1 | 35.4 | 27.0 | 5.1 | 6.0 | 8.7 | 10.6 | 3.6 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 6.0 | 0.0 | 0.0 | 0.4 | 0.1 | 0.4 | 0.0 |
| Delay (s) | 41.4 | 27.1 | 5.2 | 6.4 | 8.8 | 11.0 | 3.6 |
| Level of Service | D | C | A | A | A | B | A |
| Approach Delay (s) | 37.7 | | | 6.3 | | 9.6 | |
| Approach LOS | D | | | A | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 11.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.41 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.7 |
| Intersection Capacity Utilization | 59.5% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Lane Group | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 198 | 67 | 56 | 854 | 4 | 630 | 147 |
| v/c Ratio | 0.70 | 0.13 | 0.10 | 0.34 | 0.01 | 0.31 | 0.11 |
| Control Delay | 48.2 | 5.6 | 5.8 | 7.0 | 11.8 | 12.0 | 0.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.2 | 5.6 | 5.8 | 7.0 | 11.8 | 12.0 | 0.6 |
| Queue Length 50th (ft) | 107 | 0 | 9 | 92 | 1 | 97 | 0 |
| Queue Length 95th (ft) | 166 | 25 | 25 | 153 | 7 | 155 | 10 |
| Internal Link Dist (ft) | 568 | | | 607 | | 615 | |
| Turn Bay Length (ft) | | 100 | 250 | | 250 | | 200 |
| Base Capacity (vph) | 534 | 566 | 581 | 2485 | 356 | 2023 | 1478 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.37 | 0.12 | 0.10 | 0.34 | 0.01 | 0.31 | 0.10 |

Intersection Summary

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 55 | 5 | 704 | 63 | 8 | 469 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 61 | 6 | 782 | 70 | 9 | 521 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1356 | 817 | | | 852 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1356 | 817 | | | 852 | |
| tC, single (s) | 6.4 | 6.2 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 63 | 99 | | | 99 | |
| cM capacity (veh/h) | 164 | 379 | | | 795 | |

| Direction, Lane # | WB 1 | NB 1 | SB 1 | SB 2 |
|---|---|---|---|---|
| Volume Total | 67 | 852 | 9 | 521 |
| Volume Left | 61 | 0 | 9 | 0 |
| Volume Right | 6 | 70 | 0 | 0 |
| cSH | 172 | 1700 | 795 | 1700 |
| Volume to Capacity | 0.39 | 0.50 | 0.01 | 0.31 |
| Queue Length 95th (ft) | 42 | 0 | 1 | 0 |
| Control Delay (s) | 38.5 | 0.0 | 9.6 | 0.0 |
| Lane LOS | E | | A | |
| Approach Delay (s) | 38.5 | 0.0 | 0.2 | |
| Approach LOS | E | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.8 | | |
| Intersection Capacity Utilization | 50.9% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 60 | 9 | 560 | 42 | 22 | 909 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 67 | 10 | 622 | 47 | 24 | 1010 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1704 | 646 | | | 669 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1704 | 646 | | | 669 | |
| tC, single (s) | 6.4 | 6.2 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 33 | 98 | | | 97 | |
| cM capacity (veh/h) | 99 | 475 | | | 931 | |

| Direction, Lane # | WB 1 | NB 1 | SB 1 | SB 2 |
|---|---|---|---|---|
| Volume Total | 77 | 669 | 24 | 1010 |
| Volume Left | 67 | 0 | 24 | 0 |
| Volume Right | 10 | 47 | 0 | 0 |
| cSH | 110 | 1700 | 931 | 1700 |
| Volume to Capacity | 0.69 | 0.39 | 0.03 | 0.59 |
| Queue Length 95th (ft) | 91 | 0 | 2 | 0 |
| Control Delay (s) | 90.9 | 0.0 | 9.0 | 0.0 |
| Lane LOS | F | | A | |
| Approach Delay (s) | 90.9 | 0.0 | 0.2 | |
| Approach LOS | F | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 4.0 | | |
| Intersection Capacity Utilization | 58.4% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

| Movement | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Volume (vph) | 129 | 46 | 72 | 462 | 4 | 571 | 188 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Grade (%) | 8% | | | -4% | | 3% | |
| Total Lost time (s) | 6.7 | 5.8 | 5.8 | 7.0 | 6.4 | 6.4 | 6.7 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 |
| Frt | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1604 | 1449 | 1737 | 3610 | 1778 | 3486 | 1473 |
| Flt Permitted | 0.95 | 1.00 | 0.36 | 1.00 | 0.46 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1604 | 1449 | 651 | 3610 | 866 | 3486 | 1473 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 143 | 51 | 80 | 513 | 4 | 634 | 209 |
| RTOR Reduction (vph) | 0 | 41 | 0 | 0 | 0 | 0 | 57 |
| Lane Group Flow (vph) | 143 | 10 | 80 | 513 | 4 | 634 | 152 |
| Heavy Vehicles (%) | 8% | 7% | 6% | 2% | 0% | 2% | 8% |
| Turn Type | | pm+ov | pm+pt | | Perm | | pm+ov |
| Protected Phases | 4 | 5 | 5 | 2 | | 6 | 4 |
| Permitted Phases | | 4 | 2 | | 6 | | 6 |
| Actuated Green, G (s) | 12.4 | 18.1 | 63.9 | 63.9 | 53.0 | 53.0 | 65.4 |
| Effective Green, g (s) | 12.4 | 18.1 | 63.9 | 63.9 | 53.0 | 53.0 | 65.4 |
| Actuated g/C Ratio | 0.14 | 0.20 | 0.71 | 0.71 | 0.59 | 0.59 | 0.73 |
| Clearance Time (s) | 6.7 | 5.8 | 5.8 | 7.0 | 6.4 | 6.4 | 6.7 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 6.0 | 6.0 | 6.0 | 2.0 |
| Lane Grp Cap (vph) | 221 | 291 | 531 | 2563 | 510 | 2053 | 1070 |
| v/s Ratio Prot | c0.09 | 0.00 | 0.01 | c0.14 | | c0.18 | 0.02 |
| v/s Ratio Perm | | 0.00 | 0.10 | | 0.00 | | 0.08 |
| v/c Ratio | 0.65 | 0.04 | 0.15 | 0.20 | 0.01 | 0.31 | 0.14 |
| Uniform Delay, d1 | 36.7 | 28.9 | 4.3 | 4.4 | 7.6 | 9.3 | 3.7 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 4.8 | 0.0 | 0.0 | 0.2 | 0.0 | 0.4 | 0.0 |
| Delay (s) | 41.5 | 28.9 | 4.4 | 4.6 | 7.7 | 9.7 | 3.8 |
| Level of Service | D | C | A | A | A | A | A |
| Approach Delay (s) | 38.2 | | | 4.6 | | 8.2 | |
| Approach LOS | D | | | A | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 10.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.37 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 20.1 |
| Intersection Capacity Utilization | 48.3% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Lane Group | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 143 | 51 | 80 | 513 | 4 | 634 | 209 |
| v/c Ratio | 0.65 | 0.11 | 0.14 | 0.20 | 0.01 | 0.30 | 0.17 |
| Control Delay | 49.7 | 6.8 | 5.0 | 5.1 | 10.2 | 10.5 | 0.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 49.7 | 6.8 | 5.0 | 5.1 | 10.2 | 10.5 | 0.7 |
| Queue Length 50th (ft) | 78 | 0 | 11 | 44 | 1 | 91 | 0 |
| Queue Length 95th (ft) | 130 | 23 | 29 | 76 | 6 | 145 | 12 |
| Internal Link Dist (ft) | 553 | | | 607 | | 615 | |
| Turn Bay Length (ft) | | 100 | 250 | | 250 | | 200 |
| Base Capacity (vph) | 380 | 506 | 594 | 2564 | 522 | 2099 | 1338 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.38 | 0.10 | 0.13 | 0.20 | 0.01 | 0.30 | 0.16 |

Intersection Summary

| Movement | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Volume (vph) | 200 | 67 | 54 | 769 | 4 | 567 | 141 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Grade (%) | 8% | | | -4% | | 3% | |
| Total Lost time (s) | 6.7 | 5.8 | 5.8 | 7.0 | 6.4 | 6.4 | 6.7 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 |
| Frt | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1635 | 1449 | 1737 | 3610 | 1778 | 3486 | 1501 |
| Flt Permitted | 0.95 | 1.00 | 0.35 | 1.00 | 0.33 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1635 | 1449 | 633 | 3610 | 620 | 3486 | 1501 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 222 | 74 | 60 | 854 | 4 | 630 | 157 |
| RTOR Reduction (vph) | 0 | 56 | 0 | 0 | 0 | 0 | 43 |
| Lane Group Flow (vph) | 222 | 18 | 60 | 854 | 4 | 630 | 114 |
| Heavy Vehicles (%) | 6% | 7% | 6% | 2% | 0% | 2% | 6% |
| Turn Type | | pm+ov | pm+pt | | Perm | | pm+ov |
| Protected Phases | 4 | 5 | 5 | 2 | | 6 | 4 |
| Permitted Phases | | 4 | 2 | | 6 | | 6 |
| Actuated Green, G (s) | 16.7 | 22.3 | 59.6 | 59.6 | 48.8 | 48.8 | 65.5 |
| Effective Green, g (s) | 16.7 | 22.3 | 59.6 | 59.6 | 48.8 | 48.8 | 65.5 |
| Actuated g/C Ratio | 0.19 | 0.25 | 0.66 | 0.66 | 0.54 | 0.54 | 0.73 |
| Clearance Time (s) | 6.7 | 5.8 | 5.8 | 7.0 | 6.4 | 6.4 | 6.7 |
| Vehicle Extension (s) | 2.0 | 2.0 | 2.0 | 6.0 | 6.0 | 6.0 | 2.0 |
| Lane Grp Cap (vph) | 303 | 359 | 488 | 2391 | 336 | 1890 | 1092 |
| v/s Ratio Prot | c0.14 | 0.00 | 0.01 | c0.24 | | 0.18 | 0.02 |
| v/s Ratio Perm | | 0.01 | 0.07 | | 0.01 | | 0.06 |
| v/c Ratio | 0.73 | 0.05 | 0.12 | 0.36 | 0.01 | 0.33 | 0.10 |
| Uniform Delay, d1 | 34.5 | 25.8 | 5.8 | 6.7 | 9.5 | 11.5 | 3.6 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 7.7 | 0.0 | 0.0 | 0.4 | 0.1 | 0.5 | 0.0 |
| Delay (s) | 42.2 | 25.8 | 5.8 | 7.1 | 9.6 | 12.0 | 3.6 |
| Level of Service | D | C | A | A | A | B | A |
| Approach Delay (s) | 38.1 | | | 7.1 | | 10.3 | |
| Approach LOS | D | | | A | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 12.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.44 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 13.7 |
| Intersection Capacity Utilization | 60.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Lane Group | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 222 | 74 | 60 | 854 | 4 | 630 | 157 |
| v/c Ratio | 0.73 | 0.14 | 0.12 | 0.36 | 0.01 | 0.33 | 0.12 |
| Control Delay | 48.3 | 5.1 | 6.7 | 7.9 | 13.0 | 13.1 | 0.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.3 | 5.1 | 6.7 | 7.9 | 13.0 | 13.1 | 0.6 |
| Queue Length 50th (ft) | 120 | 0 | 10 | 100 | 1 | 102 | 0 |
| Queue Length 95th (ft) | 180 | 25 | 28 | 166 | 7 | 165 | 10 |
| Internal Link Dist (ft) | 568 | | | 607 | | 615 | |
| Turn Bay Length (ft) | | 100 | 250 | | 250 | | 200 |
| Base Capacity (vph) | 514 | 587 | 553 | 2391 | 343 | 1934 | 1386 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.43 | 0.13 | 0.11 | 0.36 | 0.01 | 0.33 | 0.11 |

Intersection Summary

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 63 | 6 | 704 | 77 | 13 | 469 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 70 | 7 | 782 | 86 | 14 | 521 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1375 | 825 | | | 868 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1375 | 825 | | | 868 | |
| tC, single (s) | 6.4 | 6.2 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 55 | 98 | | | 98 | |
| cM capacity (veh/h) | 156 | 376 | | | 785 | |

| Direction, Lane # | WB 1 | NB 1 | SB 1 | SB 2 |
|---|---|---|---|---|
| Volume Total | 77 | 868 | 14 | 521 |
| Volume Left | 70 | 0 | 14 | 0 |
| Volume Right | 7 | 86 | 0 | 0 |
| cSH | 165 | 1700 | 785 | 1700 |
| Volume to Capacity | 0.47 | 0.51 | 0.02 | 0.31 |
| Queue Length 95th (ft) | 54 | 0 | 1 | 0 |
| Control Delay (s) | 44.5 | 0.0 | 9.7 | 0.0 |
| Lane LOS | E | | A | |
| Approach Delay (s) | 44.5 | 0.0 | 0.3 | |
| Approach LOS | E | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 2.4 | | |
| Intersection Capacity Utilization | 52.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 77 | 11 | 560 | 49 | 24 | 909 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 86 | 12 | 622 | 54 | 27 | 1010 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1713 | 649 | | | 677 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1713 | 649 | | | 677 | |
| tC, single (s) | 6.4 | 6.2 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 11 | 97 | | | 97 | |
| cM capacity (veh/h) | 96 | 473 | | | 924 | |

| Direction, Lane # | WB 1 | NB 1 | SB 1 | SB 2 |
|---|---|---|---|---|
| Volume Total | 98 | 677 | 27 | 1010 |
| Volume Left | 86 | 0 | 27 | 0 |
| Volume Right | 12 | 54 | 0 | 0 |
| cSH | 107 | 1700 | 924 | 1700 |
| Volume to Capacity | 0.92 | 0.40 | 0.03 | 0.59 |
| Queue Length 95th (ft) | 138 | 0 | 2 | 0 |
| Control Delay (s) | 139.7 | 0.0 | 9.0 | 0.0 |
| Lane LOS | F | | A | |
| Approach Delay (s) | 139.7 | 0.0 | 0.2 | |
| Approach LOS | F | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 7.7 | | |
| Intersection Capacity Utilization | 59.4% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 19 | 70 | 60 | 29 | 13 | 9 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 21 | 78 | 67 | 32 | 14 | 10 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 99 | | | | 203 | 83 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 99 | | | | 203 | 83 |
| tC, single (s) | 4.2 | | | | 7.2 | 6.4 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.3 | | | | 4.2 | 3.5 |
| p0 queue free % | 99 | | | | 98 | 99 |
| cM capacity (veh/h) | 1439 | | | | 634 | 924 |

| Direction, Lane # | EB 1 | WB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 99 | 99 | 24 |
| Volume Left | 21 | 0 | 14 |
| Volume Right | 0 | 32 | 10 |
| cSH | 1439 | 1700 | 728 |
| Volume to Capacity | 0.01 | 0.06 | 0.03 |
| Queue Length 95th (ft) | 1 | 0 | 3 |
| Control Delay (s) | 1.7 | 0.0 | 10.1 |
| Lane LOS | A | | B |
| Approach Delay (s) | 1.7 | 0.0 | 10.1 |
| Approach LOS | | | B |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.9 | | |
| Intersection Capacity Utilization | 21.4% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 9 | 65 | 69 | 13 | 29 | 19 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 10 | 72 | 77 | 14 | 32 | 21 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 91 | | | | 176 | 84 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 91 | | | | 176 | 84 |
| tC, single (s) | 4.3 | | | | 6.7 | 6.3 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.4 | | | | 3.8 | 3.4 |
| p0 queue free % | 99 | | | | 96 | 98 |
| cM capacity (veh/h) | 1387 | | | | 740 | 951 |

| Direction, Lane # | EB 1 | WB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 82 | 91 | 53 |
| Volume Left | 10 | 0 | 32 |
| Volume Right | 0 | 14 | 21 |
| cSH | 1387 | 1700 | 811 |
| Volume to Capacity | 0.01 | 0.05 | 0.07 |
| Queue Length 95th (ft) | 1 | 0 | 5 |
| Control Delay (s) | 1.0 | 0.0 | 9.7 |
| Lane LOS | A | | A |
| Approach Delay (s) | 1.0 | 0.0 | 9.7 |
| Approach LOS | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 2.6 | | |
| Intersection Capacity Utilization | 20.6% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (vph) | 77 | 11 | 560 | 49 | 24 | 909 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | | 1.00 | | 1.00 | 1.00 |
| Frt | 0.98 | | 0.99 | | 1.00 | 1.00 |
| Flt Protected | 0.96 | | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1744 | | 1874 | | 1805 | 1900 |
| Flt Permitted | 0.96 | | 1.00 | | 0.36 | 1.00 |
| Satd. Flow (perm) | 1744 | | 1874 | | 692 | 1900 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 86 | 12 | 622 | 54 | 27 | 1010 |
| RTOR Reduction (vph) | 6 | 0 | 3 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 92 | 0 | 673 | 0 | 27 | 1010 |
| Heavy Vehicles (%) | 3% | 0% | 0% | 4% | 0% | 0% |
| Turn Type | | | | | Perm | |
| Protected Phases | 8 | | 2 | | | 6 |
| Permitted Phases | | | | | 6 | |
| Actuated Green, G (s) | 7.3 | | 48.5 | | 48.5 | 48.5 |
| Effective Green, g (s) | 7.3 | | 48.5 | | 48.5 | 48.5 |
| Actuated g/C Ratio | 0.11 | | 0.76 | | 0.76 | 0.76 |
| Clearance Time (s) | 4.0 | | 4.0 | | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 200 | | 1425 | | 526 | 1444 |
| v/s Ratio Prot | c0.05 | | 0.36 | | | c0.53 |
| v/s Ratio Perm | | | | | 0.04 | |
| v/c Ratio | 0.46 | | 0.47 | | 0.05 | 0.70 |
| Uniform Delay, d1 | 26.4 | | 2.9 | | 1.9 | 3.9 |
| Progression Factor | 1.00 | | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.7 | | 0.2 | | 0.0 | 1.5 |
| Delay (s) | 28.1 | | 3.1 | | 1.9 | 5.4 |
| Level of Service | C | | A | | A | A |
| Approach Delay (s) | 28.1 | | 3.1 | | | 5.3 |
| Approach LOS | C | | A | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 5.7 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.67 | | |
| Actuated Cycle Length (s) | 63.8 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 59.4% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Lane Group | WBL | NBT | SBL | SBT |
|---|---|---|---|---|
| Lane Group Flow (vph) | 98 | 676 | 27 | 1010 |
| v/c Ratio | 0.36 | 0.46 | 0.05 | 0.67 |
| Control Delay | 31.7 | 4.6 | 2.9 | 7.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 31.7 | 4.6 | 2.9 | 7.6 |
| Queue Length 50th (ft) | 34 | 79 | 2 | 167 |
| Queue Length 95th (ft) | 94 | 174 | 9 | 376 |
| Internal Link Dist (ft) | 576 | 726 | | 529 |
| Turn Bay Length (ft) | | | 125 | |
| Base Capacity (vph) | 505 | 1752 | 647 | 1776 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.19 | 0.39 | 0.04 | 0.57 |

Intersection Summary

# Appendix C

## SIGNAL WARRANT ANALYSIS

**J. M. Teague Engineering, PLLC**
525 North Main Street, Waynesville, NC
(828) 456-8383

Study Name : **Pond Road @ NC 112 - Peak Hour Signal Warrant**

# *Signal Warrants - Summary*

## Major Street Approaches

***Northbound:*** **NC 112**
Number of Lanes: **1**
85% Speed > 40 MPH.
Total Approach Volume: **5,098**

***Southbound:*** **NC 112**
Number of Lanes: **2**
85% Speed > 40 MPH.
Total Approach Volume: **7,800**

## Minor Street Approaches

***Westbound:*** **Pond Road**
Number of Lanes: **1**

Total Approach Volume: **732**

## Warrant Summary

**(Rural values apply.)**

**Warrant 1 - Eight Hour Vehicular Volumes** ..... **Not Satisfied**

**Warrant 1A - Minimum Vehicular Volume** ..... **Not Satisfied**
Required volumes reached for 0 hours, 8 are needed

**Warrant 1B - Interruption of Continuous Traffic** ..... **Not Satisfied**
Required volumes reached for 2 hours, 8 are needed

**Warrant 1 A&B - Combination of Warrants** ..... **Not Satisfied**
Required volumes reached for 0 hours, 8 are needed

**Warrant 2 - Four Hour Volumes** ..... **Not Satisfied**
Number of hours (0) volumes exceed minimum < minimum required (4).

**Warrant 3 - Peak Hour** ..... **Not Satisfied**

**Warrant 3A - Peak Hour Delay** ..... **Not Satisfied**
Approach volumes on minor street don't exceed minimums for any hour. Delay data not evaluated.

**Warrant 3B - Peak Hour Volumes** ..... **Not Satisfied**
Volumes do not exceed minimums for any hour.

**Warrant 4 - Pedestrian Volumes** ..... Not Evaluated

**Warrant 5 - School Crossing** ..... Not Evaluated

**Warrant 6 - Coordinated Signal System** ..... Not Evaluated

**Warrant 7 - Crash Experience** ..... Not Evaluated

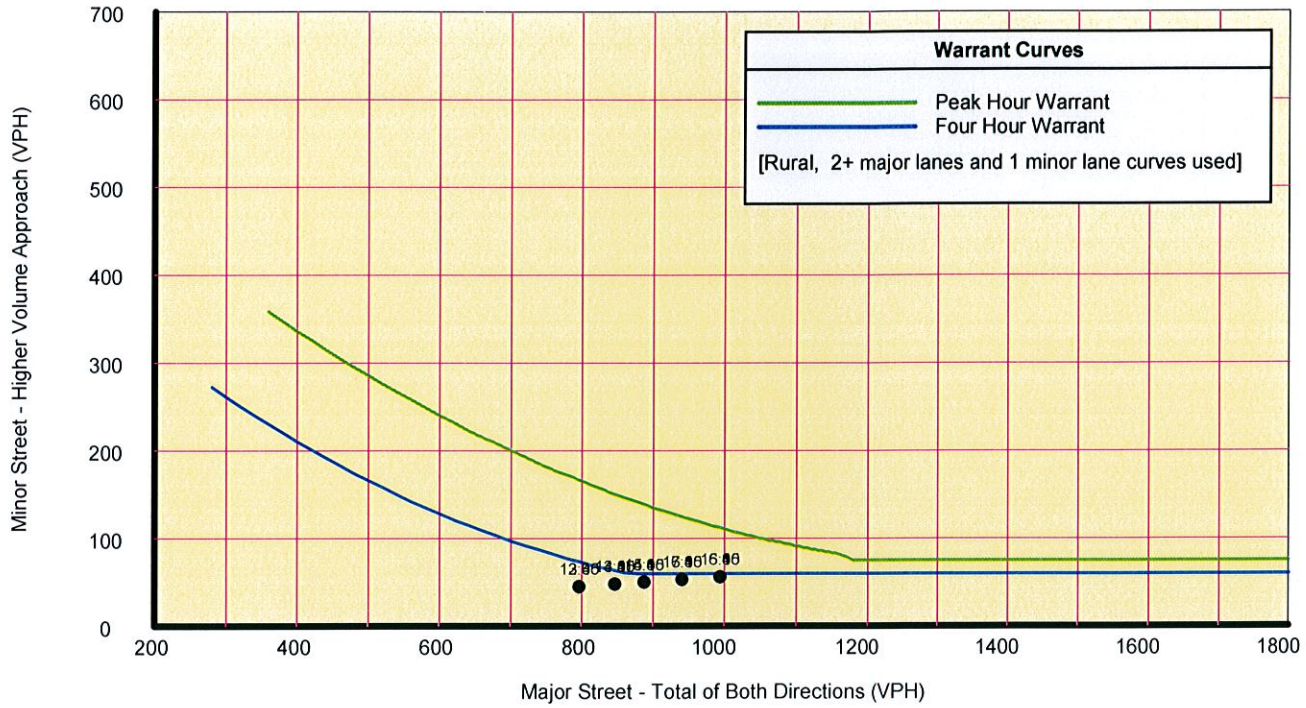
**Warrant 8 - Roadway Network** ..... Not Evaluated

**Warrant 9 - Intersection Near a Grade Crossing** ..... Not Evaluated

**J. M. Teague Engineering, PLLC**
525 North Main Street, Waynesville, NC
(828) 456-8383

Study Name : **Pond Road @ NC 112 - Peak Hour Signal Warrant**

## *Signal Warrants - Summary*




## Analysis of 8-Hour Volume Warrants:

**War 1A-Minimum Volume**

| Hour Begin | Major Total | Minor Vol | Minor Dir | Maj 420 | Min 105 |
|---|---|---|---|---|---|
| 16:00 | 994 | 56 | W | Yes | No |
| 15:45 | 994 | 56 | W | Yes | No |
| 15:30 | 994 | 56 | W | Yes | No |
| 15:15 | 994 | 56 | W | Yes | No |
| 17:00 | 941 | 53 | W | Yes | No |
| 16:45 | 941 | 53 | W | Yes | No |
| 16:30 | 941 | 53 | W | Yes | No |
| 16:15 | 941 | 53 | W | Yes | No |
| 15:00 | 888 | 50 | W | Yes | No |
| 14:45 | 888 | 50 | W | Yes | No |
| 14:30 | 888 | 50 | W | Yes | No |
| 14:15 | 888 | 50 | W | Yes | No |
| 14:00 | 847 | 48 | W | Yes | No |
| 13:45 | 847 | 48 | W | Yes | No |
| 13:30 | 847 | 48 | W | Yes | No |
| 13:15 | 847 | 48 | W | Yes | No |
| 13:00 | 797 | 45 | W | Yes | No |
| 12:45 | 797 | 45 | W | Yes | No |
| 12:30 | 797 | 45 | W | Yes | No |
| 12:15 | 797 | 45 | W | Yes | No |
| 18:00 | 789 | 45 | W | Yes | No |
| 17:45 | 789 | 45 | W | Yes | No |
| 17:30 | 789 | 45 | W | Yes | No |
| 17:15 | 789 | 45 | W | Yes | No |

**War 1B-Interruption of Traffic**

| Hour Begin | Major Total | Minor Vol | Minor Dir | Maj 630 | Min 53 |
|---|---|---|---|---|---|
| 15:15 | 994 | 56 | W | Yes | Yes |
| 16:15 | 941 | 53 | W | Yes | Yes |
| 15:00 | 888 | 50 | W | Yes | No |
| 14:45 | 888 | 50 | W | Yes | No |
| 14:30 | 888 | 50 | W | Yes | No |
| 14:15 | 888 | 50 | W | Yes | No |
| 14:00 | 847 | 48 | W | Yes | No |
| 13:45 | 847 | 48 | W | Yes | No |
| 13:30 | 847 | 48 | W | Yes | No |
| 13:15 | 847 | 48 | W | Yes | No |
| 13:00 | 797 | 45 | W | Yes | No |
| 12:45 | 797 | 45 | W | Yes | No |
| 12:30 | 797 | 45 | W | Yes | No |
| 12:15 | 797 | 45 | W | Yes | No |
| 18:00 | 789 | 45 | W | Yes | No |
| 17:45 | 789 | 45 | W | Yes | No |
| 17:30 | 789 | 45 | W | Yes | No |
| 17:15 | 789 | 45 | W | Yes | No |
| 10:00 | 739 | 42 | W | Yes | No |
| 09:45 | 739 | 42 | W | Yes | No |
| 09:30 | 739 | 42 | W | Yes | No |
| 09:15 | 739 | 42 | W | Yes | No |
| 19:00 | 738 | 42 | W | Yes | No |
| 18:45 | 738 | 42 | W | Yes | No |

**War 1C-Combination of Warrants**

| Hour Begin | Major Total | Minor Vol | Minor Dir | Maj 504 | Min 84 |
|---|---|---|---|---|---|
| 16:00 | 994 | 56 | W | Yes | No |
| 15:45 | 994 | 56 | W | Yes | No |
| 15:30 | 994 | 56 | W | Yes | No |
| 15:15 | 994 | 56 | W | Yes | No |
| 17:00 | 941 | 53 | W | Yes | No |
| 16:45 | 941 | 53 | W | Yes | No |
| 16:30 | 941 | 53 | W | Yes | No |
| 16:15 | 941 | 53 | W | Yes | No |
| 15:00 | 888 | 50 | W | Yes | No |
| 14:45 | 888 | 50 | W | Yes | No |
| 14:30 | 888 | 50 | W | Yes | No |
| 14:15 | 888 | 50 | W | Yes | No |
| 14:00 | 847 | 48 | W | Yes | No |
| 13:45 | 847 | 48 | W | Yes | No |
| 13:30 | 847 | 48 | W | Yes | No |
| 13:15 | 847 | 48 | W | Yes | No |
| 13:00 | 797 | 45 | W | Yes | No |
| 12:45 | 797 | 45 | W | Yes | No |
| 12:30 | 797 | 45 | W | Yes | No |
| 12:15 | 797 | 45 | W | Yes | No |
| 18:00 | 789 | 45 | W | Yes | No |
| 17:45 | 789 | 45 | W | Yes | No |
| 17:30 | 789 | 45 | W | Yes | No |
| 17:15 | 789 | 45 | W | Yes | No |

## *7.0 Signature Pages*

36. Applicant Signature Page is enclosed.
37. Contract Operator Signature Page is enclosed.
38. Property Owner Signature Page is enclosed.

## 8.0 Engineering Plans

Engineering Site Plan enclosed as Figure 5.

# FIGURES

## FIGURE 1: PRELIMINARY PLAT

PLAT BOOK PAGE

STATE OF NORTH CAROLINA
COUNTY OF BUNCOMBE
I,_______________________, Review Officer of Buncombe County, certify that the map or plat to which this certification is affixed meets all statutory requirements for recording.

_______________________
Review Officer

_______________________
Date:

North Carolina, Buncombe County
REGISTERED THIS THE ____ DAY OF__________________
AT ________ M. RECORDED IN BOOK _____, PAGE____
_______________________ REGISTER OF DEEDS
BY: _______________________ DEPUTY/ASSISTANT

CITY OF ASHEVILLE

Approved by the City of Asheville, NC Planning and Development Department on this the _____ day of _____________, 2015; provided the plat is registered in the Office of the Register of Deeds of Buncombe County, NC within 30 days of the date of this approval.

Signed: _______________________
Planning and Development

## PROPERTY LINE CHART

| LINE | BEARING | DISTANCE |
|---|---|---|
| L1 | S 49°05'44" E | 34.40' |
| L2 | S 49°05'44" E | 7.03' |
| L3 | S 31°01'04" E | 48.86' |
| L4 | S 35°34'10" E | 5.33' |
| L5 | S 35°34'10" E | 15.84' |
| L6 | S 65°55'54" E | 12.67' |
| L7 | S 32°32'29" E | 17.60' |
| L8 | S 57°44'29" E | 66.94' |
| L9 | S 03°02'59" W | 85.92' |
| L10 | N 29°31'25" W | 46.48' |
| L11 | N 29°31'25" W | 60.13' |
| L12 | N 29°31'25" W | 25.58' |

## POND ROAD R/W LINE CHART

| | | |
|---|---|---|
| L13 | S 26°12'15" W | 235.15' |
| L14 | S 35°17'52" W | 75.68' |
| L15 | S 06°22'24" E | 76.54' |
| L16 | S 69°37'36" W | 282.81' |
| L17 | N 64°44'10" W | 39.03' |
| L18 | S 18°14'22" W | 89.73' |
| L19 | S 35°32'55" W | 47.12' |
| L20 | S 56°43'17" W | 175.17' |
| L21 | N 56°43'17" E | 179.11' |
| L22 | N 35°32'55" E | 47.12' |
| L23 | N 18°14'22" E | 89.73' |
| L24 | S 64°44'10" E | 39.03' |
| L25 | N 69°37'36" E | 282.81' |
| L26 | N 06°22'24" W | 76.54' |
| L27 | N 35°17'52" E | 75.68' |
| L28 | N 26°12'15" E | 235.15' |

## DRIVEWAY EASEMENT LINE CHART

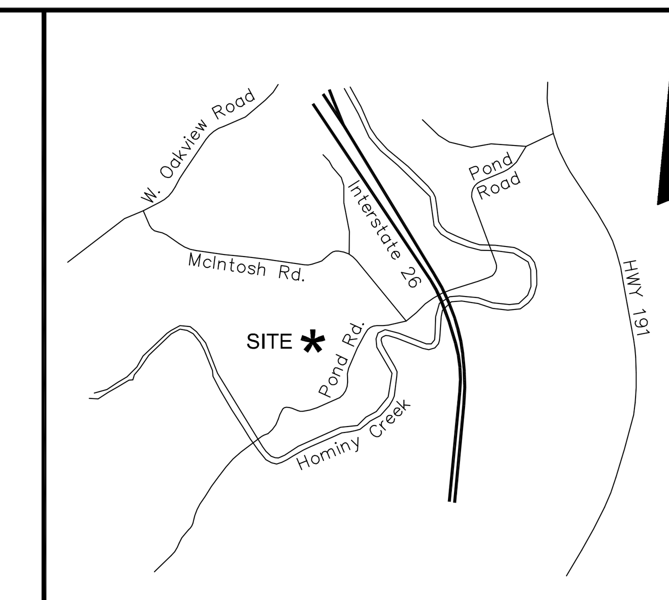
| | | |
|---|---|---|
| L29 | N 33°06'47" W | 65.36' |
| L30 | N 04°16'13" E | 38.65' |
| L31 | N 00°29'57" E | 75.00' |
| L32 | N 44°51'48" W | 165.13' |
| L33 | N 51°40'56" W | 71.03' |
| L34 | N 03°43'53" W | 1.81' |
| L35 | N 03°43'53" W | 34.86' |
| L36 | N 09°18'39" E | 52.19' |
| L37 | S 44°51'48" E | 260.85' |
| L38 | S 25°56'10" E | 97.07' |

## POND ROAD R/W CURVE CHART

| CURVE | RADIUS | ARC LENGTH | CHORD BEARING | CHORD LENGTH |
|---|---|---|---|---|
| C1 | 530.00' | 194.39' | S 36°42'41" W | 193.30' |
| C2 | 120.00' | 19.05' | S 30°45'04" W | 19.03' |
| C3 | 130.00' | 94.55' | S 14°27'44" W | 92.48' |
| C4 | 185.00' | 245.39' | S 31°37'36" W | 227.79' |
| C5 | 245.00' | 65.44' | S 77°16'42" W | 65.24' |
| C6 | 245.00' | 129.71' | N 79°54'11" W | 128.20' |
| C7 | 127.50' | 215.91' | S 66°45'06" W | 191.02' |
| C8 | 70.00' | 21.15' | S 26°53'39" W | 21.07' |
| C9 | 295.00' | 27.66' | S 38°14'06" W | 27.65' |
| C10 | 295.00' | 81.35' | S 48°49'17" W | 81.09' |
| C11 | 355.00' | 131.18' | N 46°08'06" E | 130.44' |
| C12 | 130.00' | 39.27' | N 26°53'39" E | 39.12' |
| C13 | 67.50' | 114.30' | N 66°45'06" E | 101.13' |
| C14 | 305.00' | 242.94' | S 87°33'17" E | 236.57' |
| C15 | 245.00' | 324.98' | N 31°37'36" E | 301.67' |
| C16 | 70.00' | 50.91' | N 14°27'44" E | 49.80' |
| C17 | 180.00' | 28.57' | N 30°45'04" E | 28.54' |
| C18 | 470.00' | 162.52' | N 36°06'38" E | 161.71' |

## DRIVEWAY EASEMENT CURVE CHART

| | | | | |
|---|---|---|---|---|
| C19 | 100.00' | 65.25' | N 14°25'17" W | 64.09' |
| C20 | 120.00' | 95.01' | N 22°10'55" W | 92.55' |
| C21 | 90.00' | 87.88' | N 16°53'20" W | 84.43' |
| C22 | 50.00' | 41.85' | N 27°42'25" W | 40.63' |
| C23 | 50.00' | 11.38' | N 02°47'23" E | 11.36' |
| C24 | 120.00' | 158.54' | S 07°00'57" E | 147.25' |
| C25 | 30.00' | 9.91' | S 35°23'59" E | 9.87' |




SITE LOCATION SKETCH
NOT TO SCALE

## LEGEND

- PROPERTY LINE
- ADJOINER'S PROPERTY LINE
- RIGHT-OF-WAY
- EASEMENT
- CENTERLINE
- SETBACK LINE AS NOTED
- BUILDING LINE
- EDGE OF PAVEMENT
- EDGE OF GRAVEL
- SOIL ROAD (AS NOTED)
- FENCE AS NOTED
- SANITARY SEWER LINE
- STORMWATER PIPE (AS NOTED)
- CENTERLINE OF CREEK
- CREEK BUFFER
- WETLAND
- FLOODWAY
- 100 YEAR FLOODPLAIN
- 500 YEAR FLOODPLAIN
- FLOODPLAIN CROSS SECTION
- CORNER TREE FOUND (AS NOTED)
- REBAR FOUND (AS DESCRIBED)
- REBAR SET
- IRON PIPE FOUND (AS NOTED)
- MAGNETIC NAIL FOUND
- CALCULATED PROPERTY CORNER

PLAT NOTES:

1. The bearings on this plat are NC Grid (NAD 83) bearings, and distances shown are horizontal ground distances unless otherwise noted.
2. Total area of parcel being subdivided: 55.79 acres (including Pond Road right-of-way); Area determined by coordinate computation method.
3. The purpose of this plat is to subdivide property as shown herein.
4. This property is zoned EMP, Emplyment District. Required building setbacks are Front: 20', Side: 10', Rear: 20'; Maximum building height is 90'.
5. By graphic determination, portions of the Subject Parcels are located in "Zone AE" per FIRM map number 3700962700J dated January 6, 2010.
6. Buncombe County GIS was used to determine adjoiner owner information.
7. Underground utilities were not marked at the time of the survey.
8. Above ground utilities are located based on visible, above ground structures.
9. Property subject to all easements, rights-of-way and restrictions of record.
10. This plat was prepared without the benefit of a title report which may reveal additional conveyances, easements, rights-of-way or building restrictions. A North Carolina licensed attorney-at-law should be consulted.

I, Paul E. Sexton , Professional Land Surveyor certify to one or more of the following as indicated:

_X_ A. That this plat is of a survey that creates a subdivision of land within a county or municipality that has an ordinance that regulates parcels of land;

____ B. That this plat is a survey that is located in an area of a County or municipality that has no ordinance that regulates parcels of land;

____ C. Any one of the following:
1. That the survey is of an existing parcel or parcels of land and does not create a new street or change an existing street.
2. That the survey is of an existing building or other structure, or natural feature, such as a water course.
3. That the survey is a control survey.

____ D. That the survey is of another category, such as the recombination of existing parcels, a court-ordered survey, or other exception to to the definition of a subdivision;

____ E. That the information available to the surveyor is such that the surveyor is unable to make a determination to the best of the surveyor's professional ability as to provisions contained in (A) through (D) above.

I, Paul E. Sexton, certify that this plat was drawn by me from an actual survey made under my supervision (deed description recorded in Deed Book 4809, Page 750); that the boundaries not surveyed are clearly indicated as drawn from information found in Book N/A, Page N/A; that the ratio of precision as calculated is 1:10000; that this plat was prepared in accordance with G.S. 47-30 as amended.

Witness my hand and seal this __________ day of _____________A.D 2015.

Signature_______________________________________
Professional Land Surveyor
Certificate Number L-4447

BROOKS ENGINEERING ASSOC. NORTH CAROLINA CERT # C-3125

NORTH CAROLINA PROFESSIONAL NO L-4447 LAND SURVEYOR PAUL E. SEXTON

SCALE 1"=100'

0' 100' 200' 300'

Survey For:
Current Owner: Julia M. Hipps

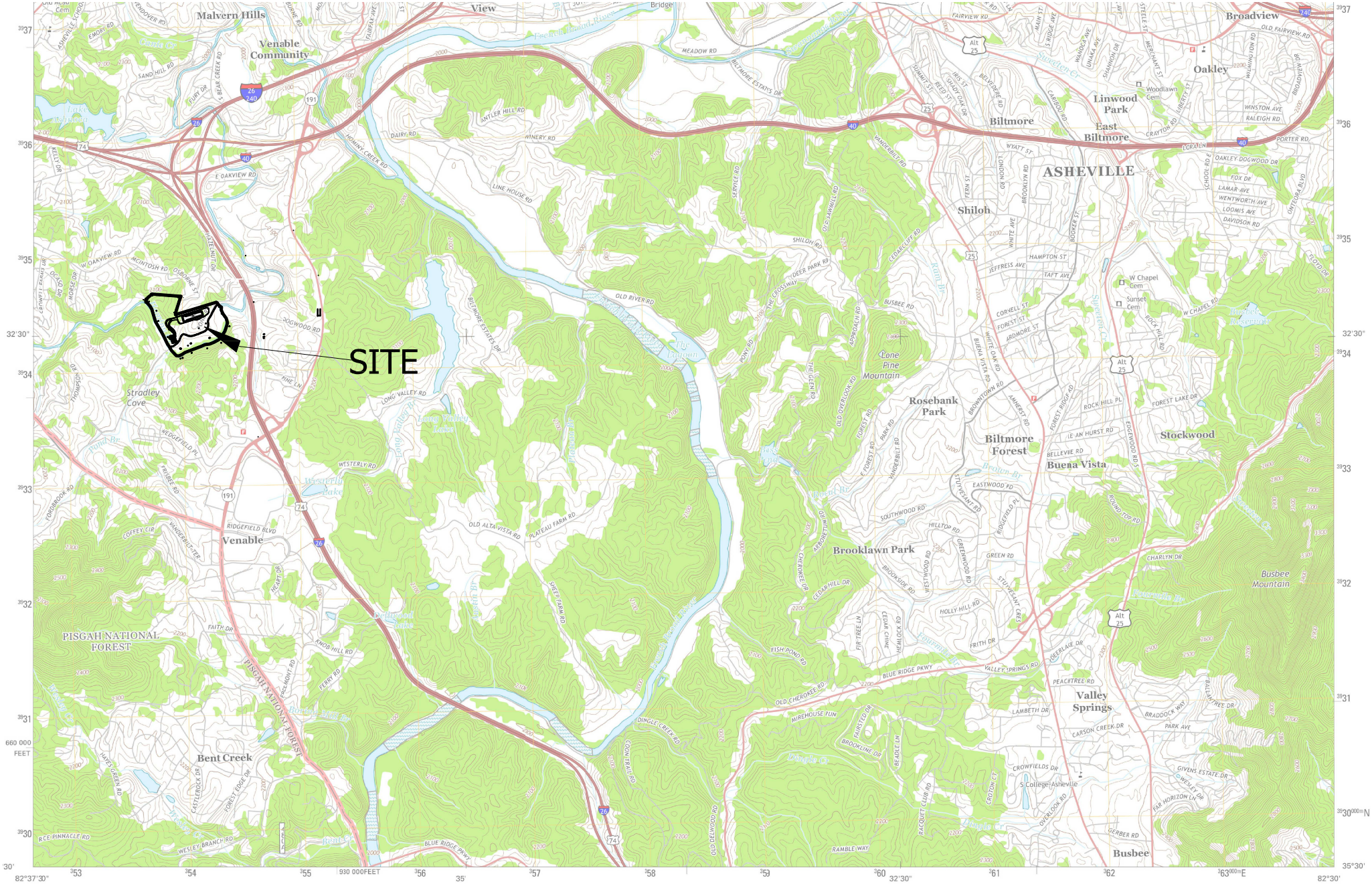
Deed Book 4809 Page 750
Tax PIN: 9627-61-0961-00000
Lower Hominy Township
Buncombe County, NC
February 1, 2015 Scale: 1" = 100'


BROOKS
ENGINEERING ASSOCIATES
BROOKS ENGINEERING ASSOCIATES
17 ARLINGTON STREET
ASHEVILLE, N.C. 28801
Phone: (828) 232-4700
Fax: (828) 232-1331


DRAWN BY:??? CHECKED BY:???

PROJECT#:

## FIGURE 2: USGS QUADRANGLE MAP




Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 17S
10 000-foot ticks: North Carolina Coordinate System of 1983

Imagery.....NAIP, September 2012
Roads.....©2006-2012 TomTom
Roads within US Forest Service Lands.....FSTopo Data with limited Forest Service updates, 2013
Names.....GNIS, 2013
Hydrography.....National Hydrography Dataset, 2012
Contours.....National Elevation Dataset, 2008
Boundaries.....Census, IBWC, IBC, USGS, 1972 - 2012

MN
GN
6° 23'
113 MILS
0° 54'
16 MILS

UTM GRID AND 2013 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

| U.S. National Grid |
|---|
| 100,000-m Square ID |
| LV |
| Grid Zone Designation |
| 17S |

SCALE 1:24 000

KILOMETERS
METERS
MILES
FEET

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.11

NORTH CAROLINA

QUADRANGLE LOCATION

| | | |
|---|---|---|
| Leicester | Weaverville | Craggy Pinnacle |
| Enka | Asheville | Oteen |
| Dunsmore Mountain | Skyland | Fruitland |

ROAD CLASSIFICATION

Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route
FS Primary Route
FS Passenger Route
FS High Clearance Route

Check with local Forest Service unit for current travel conditions and restrictions.

ASHEVILLE, NC
2013

## FIGURE 3: FEMA FLOODPLAIN MAP

Northing: = 673,888, Easting = 923,746

Northing: = 673,888, Easting = 929,850

Without Base Flood Elevation (BFE)
*Zone A, V, A99*
With BFE or Depth
*Zone AE, AO, AH, VE, AR*

Regulatory Floodway

0.2% Annual Chance Flood Hazard

Future Conditions 1% Annual Chance Flood Hazard *Zone X*

Areas Determined to be Outside the 0.2% Annual Chance Flood Hazard
*Zone X*

Jurisdiction Boundary

FIRM Panel Boundary

North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet 1:6,000

0 125 250 500 Feet

0 25 50 100 Meters

FEMA National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

**Panel(s):9864,9874**
**CONTAINS:**

| COMMUNITY | CID |
|---|---|
| BUNCOMBE COUNTY | 370031 |
| CITY OF ASHEVILLE | 370032 |

**Notice to User: The Map Number(s) shown below should be used when placing map orders; the Community Number(s) shown above should be used on insurance applications for the subject community.**

**SELECTED PANELS:**

| MAP NUMBER | EFFECTIVE DATE |
|---|---|
| 3710986400J | 2/2/2007 |
| 3710987400J | 2/2/2007 |

Northing: = 669,171, Easting = 923,746



Northing: = 669,171, Easting = 929,850

**This is an official copy of a portion of the above referenced flood map. This map incorporates changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov.**

# FIGURE 4: SEDIMENTATION & EROSION CONTROL PLANS

## STORMWATER NOTES

IMPERVIOUS SURFACES INFORMATION

EXISTING:
TOTAL: 0.17 (7.4%)

FINAL
TOTAL: 1.68 ac (73.0%)

NCREASE IN IMPERVIOUS AREA
TOTAL: 1.51 ac (65.7%)

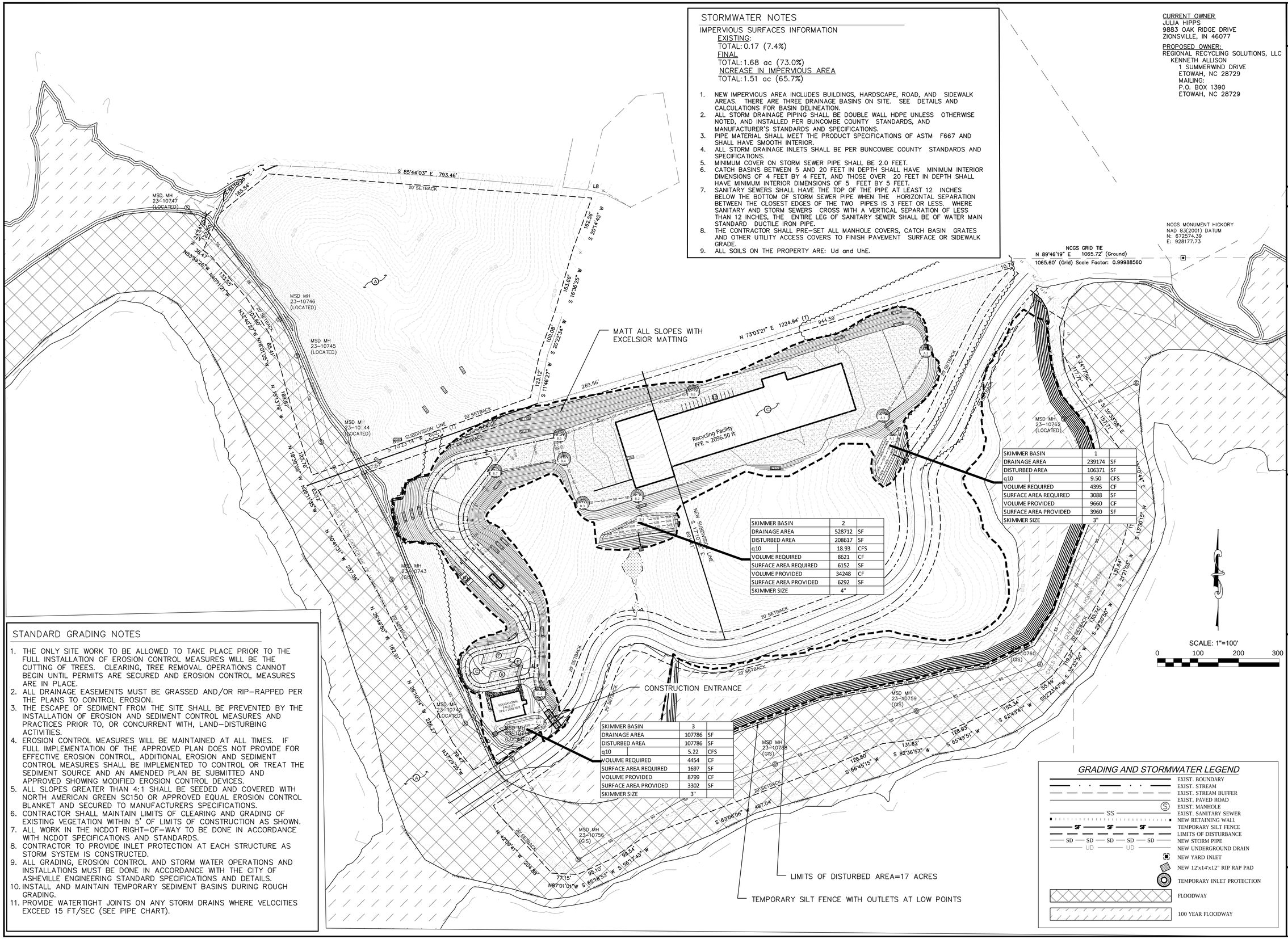
1. NEW IMPERVIOUS AREA INCLUDES BUILDINGS, HARDSCAPE, ROAD, AND SIDEWALK AREAS. THERE ARE THREE DRAINAGE BASINS ON SITE. SEE DETAILS AND CALCULATIONS FOR BASIN DELINEATION.
2. ALL STORM DRAINAGE PIPING SHALL BE DOUBLE WALL HDPE UNLESS OTHERWISE NOTED, AND INSTALLED PER BUNCOMBE COUNTY STANDARDS, AND MANUFACTURER'S STANDARDS AND SPECIFICATIONS.
3. PIPE MATERIAL SHALL MEET THE PRODUCT SPECIFICATIONS OF ASTM F667 AND SHALL HAVE SMOOTH INTERIOR.
4. ALL STORM DRAINAGE INLETS SHALL BE PER BUNCOMBE COUNTY STANDARDS AND SPECIFICATIONS.
5. MINIMUM COVER ON STORM SEWER PIPE SHALL BE 2.0 FEET.
6. CATCH BASINS BETWEEN 5 AND 20 FEET IN DEPTH SHALL HAVE MINIMUM INTERIOR DIMENSIONS OF 4 FEET BY 4 FEET, AND THOSE OVER 20 FEET IN DEPTH SHALL HAVE MINIMUM INTERIOR DIMENSIONS OF 5 FEET BY 5 FEET.
7. SANITARY SEWERS SHALL HAVE THE TOP OF THE PIPE AT LEAST 12 INCHES BELOW THE BOTTOM OF STORM SEWER PIPE WHEN THE HORIZONTAL SEPARATION BETWEEN THE CLOSEST EDGES OF THE TWO PIPES IS 3 FEET OR LESS. WHERE SANITARY AND STORM SEWERS CROSS WITH A VERTICAL SEPARATION OF LESS THAN 12 INCHES, THE ENTIRE LEG OF SANITARY SEWER SHALL BE OF WATER MAIN STANDARD DUCTILE IRON PIPE.
8. THE CONTRACTOR SHALL PRE-SET ALL MANHOLE COVERS, CATCH BASIN GRATES AND OTHER UTILITY ACCESS COVERS TO FINISH PAVEMENT SURFACE OR SIDEWALK GRADE.
9. ALL SOILS ON THE PROPERTY ARE: Ud and UhE.


CURRENT OWNER
JULIA HIPPS
9883 OAK RIDGE DRIVE
ZIONSVILLE, IN 46077

PROPOSED OWNER:
REGIONAL RECYCLING SOLUTIONS, LLC
KENNETH ALLISON
1 SUMMERWIND DRIVE
ETOWAH, NC 28729
MAILING:
P.O. BOX 1390
ETOWAH, NC 28729


NCGS MONUMENT HICKORY
NAD 83(2001) DATUM
N: 672574.39
E: 928177.73

NCGS GRID TIE
N 89°46'19" E 1065.72' (Ground)
1065.60' (Grid) Scale Factor: 0.99988560




| SKIMMER BASIN | 1 | |
|---|---|---|
| DRAINAGE AREA | 239174 | SF |
| DISTURBED AREA | 106371 | SF |
| q10 | 9.50 | CFS |
| VOLUME REQUIRED | 4395 | CF |
| SURFACE AREA REQUIRED | 3088 | SF |
| VOLUME PROVIDED | 9660 | CF |
| SURFACE AREA PROVIDED | 3960 | SF |
| SKIMMER SIZE | 3" | |

| SKIMMER BASIN | 2 | |
|---|---|---|
| DRAINAGE AREA | 528712 | SF |
| DISTURBED AREA | 208617 | SF |
| q10 | 18.93 | CFS |
| VOLUME REQUIRED | 8621 | CF |
| SURFACE AREA REQUIRED | 6152 | SF |
| VOLUME PROVIDED | 34248 | CF |
| SURFACE AREA PROVIDED | 6292 | SF |
| SKIMMER SIZE | 4" | |

| SKIMMER BASIN | 3 | |
|---|---|---|
| DRAINAGE AREA | 107786 | SF |
| DISTURBED AREA | 107786 | SF |
| q10 | 5.22 | CFS |
| VOLUME REQUIRED | 4454 | CF |
| SURFACE AREA REQUIRED | 1697 | SF |
| VOLUME PROVIDED | 8799 | CF |
| SURFACE AREA PROVIDED | 3302 | SF |
| SKIMMER SIZE | 3" | |

## STANDARD GRADING NOTES

1. THE ONLY SITE WORK TO BE ALLOWED TO TAKE PLACE PRIOR TO THE FULL INSTALLATION OF EROSION CONTROL MEASURES WILL BE THE CUTTING OF TREES. CLEARING, TREE REMOVAL OPERATIONS CANNOT BEGIN UNTIL PERMITS ARE SECURED AND EROSION CONTROL MEASURES ARE IN PLACE.
2. ALL DRAINAGE EASEMENTS MUST BE GRASSED AND/OR RIP-RAPPED PER THE PLANS TO CONTROL EROSION.
3. THE ESCAPE OF SEDIMENT FROM THE SITE SHALL BE PREVENTED BY THE INSTALLATION OF EROSION AND SEDIMENT CONTROL MEASURES AND PRACTICES PRIOR TO, OR CONCURRENT WITH, LAND-DISTURBING ACTIVITIES.
4. EROSION CONTROL MEASURES WILL BE MAINTAINED AT ALL TIMES. IF FULL IMPLEMENTATION OF THE APPROVED PLAN DOES NOT PROVIDE FOR EFFECTIVE EROSION CONTROL, ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED TO CONTROL OR TREAT THE SEDIMENT SOURCE AND AN AMENDED PLAN BE SUBMITTED AND APPROVED SHOWING MODIFIED EROSION CONTROL DEVICES.
5. ALL SLOPES GREATER THAN 4:1 SHALL BE SEEDED AND COVERED WITH NORTH AMERICAN GREEN SC150 OR APPROVED EQUAL EROSION CONTROL BLANKET AND SECURED TO MANUFACTURERS SPECIFICATIONS.
6. CONTRACTOR SHALL MAINTAIN LIMITS OF CLEARING AND GRADING OF EXISTING VEGETATION WITHIN 5' OF LIMITS OF CONSTRUCTION AS SHOWN.
7. ALL WORK IN THE NCDOT RIGHT-OF-WAY TO BE DONE IN ACCORDANCE WITH NCDOT SPECIFICATIONS AND STANDARDS.
8. CONTRACTOR TO PROVIDE INLET PROTECTION AT EACH STRUCTURE AS STORM SYSTEM IS CONSTRUCTED.
9. ALL GRADING, EROSION CONTROL AND STORM WATER OPERATIONS AND INSTALLATIONS MUST BE DONE IN ACCORDANCE WITH THE CITY OF ASHEVILLE ENGINEERING STANDARD SPECIFICATIONS AND DETAILS.
10. INSTALL AND MAINTAIN TEMPORARY SEDIMENT BASINS DURING ROUGH GRADING.
11. PROVIDE WATERTIGHT JOINTS ON ANY STORM DRAINS WHERE VELOCITIES EXCEED 15 FT/SEC (SEE PIPE CHART).

## GRADING AND STORMWATER LEGEND

- EXIST. BOUNDARY
- EXIST. STREAM
- EXIST. STREAM BUFFER
- EXIST. PAVED ROAD
- EXIST. MANHOLE
- EXIST. SANITARY SEWER
- NEW RETAINING WALL
- TEMPORARY SILT FENCE
- LIMITS OF DISTURBANCE
- NEW STORM PIPE
- NEW UNDERGROUND DRAIN
- NEW YARD INLET
- NEW 12'x14'x12" RIP RAP PAD
- TEMPORARY INLET PROTECTION
- FLOODWAY
- 100 YEAR FLOODWAY

| No. | REVISIONS/SUBMISSIONS | Date |
|---|---|---|
| | | |

Revision/Submission number with a triangle indicates changes made on this sheet

PERMIT DOCUMENTS

Designed: TMM
Drawn: GLW
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Reviewed: TMM
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Date: 03-05-15


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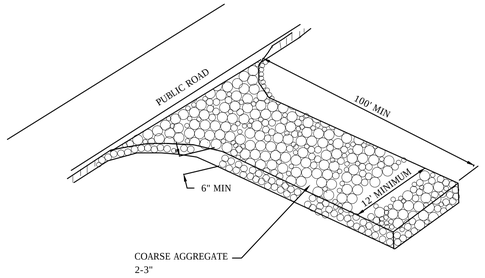
BC RECYCLING CENTER
BUNCOMBE COUNTY NORTH CAROLINA

Project No: 412415

C-3.0

Drawing Title: GRADING AND EROSION CONTROL PLAN




NOTES:

a. GRAVEL PAD TO BE 12'x 100' AND 6" THICK MINIMUM
b. TURNING RADIUS SUFFICIENT TO ACCOMMODATE LARGE TRUCKS IS TO BE PROVIDED.
c. ENTRANCE(S) SHOULD BE LOCATED TO PROVIDE FOR MAXIMUM UTILITY BY ALL CONSTRUCTION VEHICLES.
d. MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOPDRESSING WITH STONE SILL BE NECESSARY; KEEP SOME HANDY.
e. ANY MATERIAL WHICH STILL MAKES IT ONTO THE ROAD MUST BE CLEANED UP IMMEDIATELY.
f. APPLICABLE AT ALL POINTS OF INGRESS & EGRESS UNTIL SITE IS STABILIZED. FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE MUST BE PROVIDED.

1 TEMPORARY CONSTRUCTION ENTRANCE - NCDENR Std. #6.06

SCALE= NTS

**Figure 6.83a** Space check dams in a channel so that the crest of downstream dam is at elevation of the toe of upstream dam.

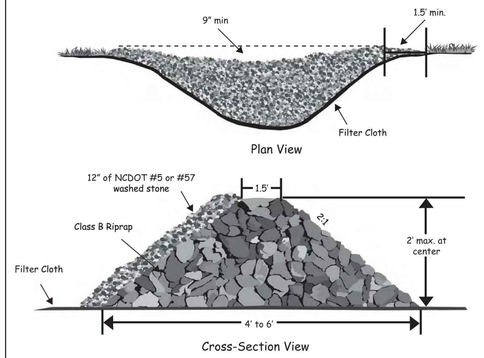



**Figure 6.83b** Stone check dam stone should be placed over the channel banks to keep water from cutting around the dam.

Maintenance

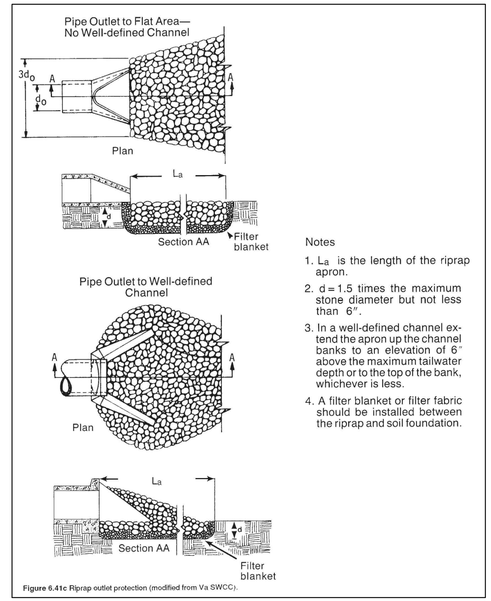
Inspect check dams and channels at least weekly and after each significant (1/2 inch or greater) rainfall event and repair immediately. Clean out sediment, straw, limbs, or other debris that could clog the channel when needed.

Anticipate submergence and deposition above the check dam and erosion from high flows around the edges of the dam. Correct all damage immediately. If significant erosion occurs between dams, additional measures can be taken such as, installing a protective riprap liner in that portion of the channel (Practice 6.31, *Riprap-line and Paved Channels*).

Remove sediment accumulated behind the dams as needed to prevent damage to channel vegetation, allow the channel to drain through the stone check dam, and prevent large flows from carrying sediment over the dam. Add stones to dams as needed to maintain design height and cross section.

2 CHECK DAM

SCALE= NTS



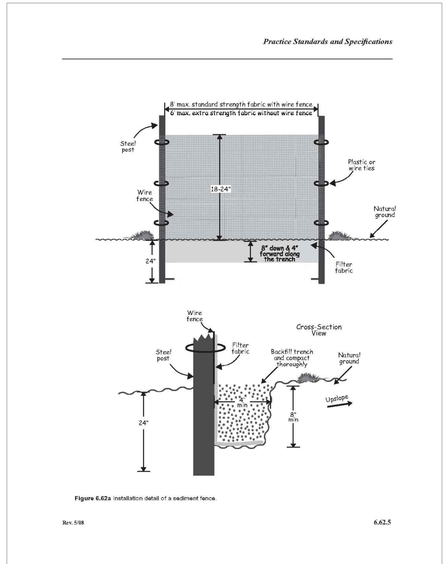

Notes

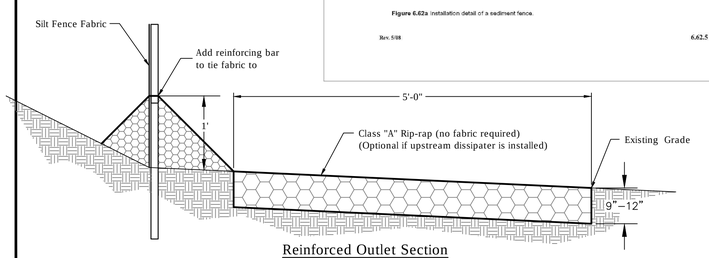
1. $L_a$ is the length of the riprap apron.
2. d = 1.5 times the maximum stone diameter but not less than 6".
3. In a well-defined channel extend the apron up the channel banks to an elevation of 6" above the maximum tailwater depth or to the top of the bank, whichever is less.
4. A filter blanket or filter fabric should be installed between the riprap and soil foundation.

**Figure 6.41c** Riprap outlet protection (modified from Va SWCC).

3 OUTLET PROTECTION

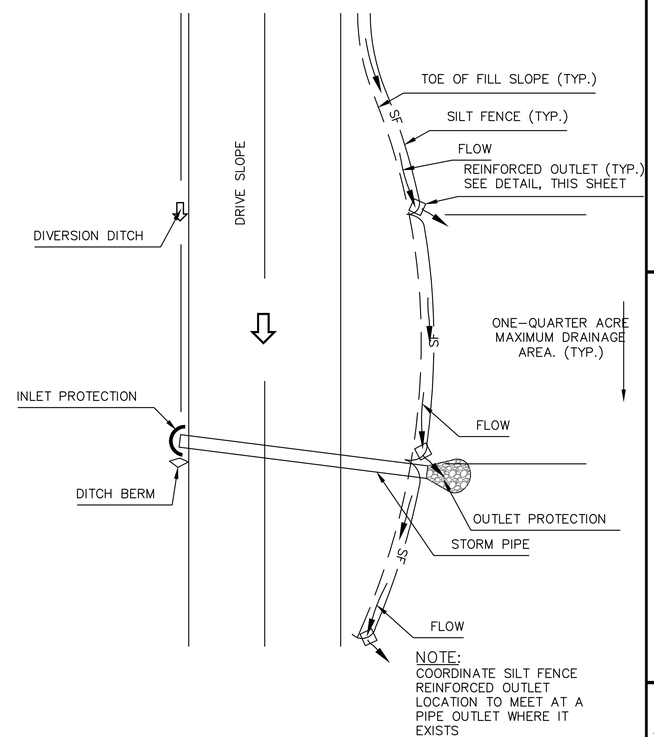
SCALE= NTS




4 SILT FENCE DETAIL - NCDENR 6.62.5

SCALE= NTS




6 SILT FENCE CONSTRUCTION DETAIL

SCALE= NTS

| No. | REVISIONS/SUBMISSIONS | Date |
|---|---|---|
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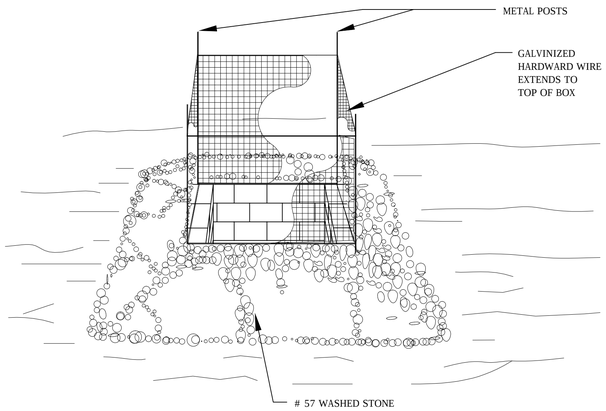
BUNCOMBE COUNTY NORTH CAROLINA

Project No: 412415

C-7.0

Drawing Title: EROSION CONTROL DETAILS




4 INLET PROTECTION

SCALE= NTS

## PERMANENT SEEDING

Seeding mixture

| Species' | Rate (lb/acre) |
|---|---|
| Tall fescue blend (equal parts of two or preferably three turf-type tall fescues) | 200-250 |

Seeding dates

Best Possible

Below 2500 ft: Aug. 15 - Sept. 1 July 25 - Sept. 15
Mar. i-Apr. 1 Mar. l-MaylO
Above 2500 ft: July 25 - Aug. 15 July 15 - Aug. 30
Mar. 20-Apr. 20 Mar. 5-May15

Soil amendments

Apply lime and fertilizer according to soil tests, or apply 4,000 lb/acre ground agricultural limestone and 1,200 lb/acre 10-10-10 fertilizer.

Mulch

Apply 3,000-4,000 lb/acre grain straw or equivalent cover of another suitable mulch. Anchor mulch by tacking with asphalt, roving, or netting or by rolling and watering.

Maintenance

The bunch-type habit of tall fescue restricts its spread into damaged areas. Reseed bare spots in the fall. Refertilize annually in late winter and again in fall. Reseed, fertilize, and mulch damaged areas immediately.

## TEMPORARY SEEDING

Temporary Seeding
Winter and Early Spring
Recommendations for Late
Seeding mixture

| Species | Rate (lb/acre) |
|---|---|
| Rye (grain) | 120 |
| Annual lespedeza (Kobein Piedmont | 50 |

Omit annual lespedeza when duration of temporary cover is not to extend beyond June.

Seeding dates

Mountains--Above 2500 ft: Feb. 15 - May 15
Below 2500 ft: Feb. 1 - May 1
Piedmont--Jan. l-Mayl
Coastal Plain--Dec. i-Apr. 15

Soil amendments

Follow recommendations of soil tests or apply 4,000 lb/acre ground agricultural limestone and 1000 lb/acre 10-10-10 fertilizer.

Mulch

Apply 4,000 lb/acre straw. Anchor straw by tacking with asphalt, netting, or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

Maintenance

Refertilize if growth is not fully adequate. Reseed, refertilize and mulch immediately following erosion or other damage.

2 SEEDING

SCALE= NTS

## STANDARD GRADING NOTES

1. The only site work to be allowed to take place prior to the full installation of erosion control measures will be the cutting of trees. Clearing, tree removal operations cannot begin until permits are secured and erosion control measures are in place.
2. The escape of sediment from the site shall be prevented by the installation of erosion and sediment control measures and practices prior to, or concurrent with, land–disturbing activities.
3. All cut steepr than 2:1 shall be designed by a North Carolina registered professional Engineer. All fill steepr than 2:1 shall be designed by a North Carolina registered professional Engineer.
4. All slopes greater higher than 5.0' shall be seeded and covered with North American Green SC150 or approved equal erosion control blanket and secured to manufacturers specifications.
5. Maintain positive drainage from the face of all walls.
6. All grading, drainage, and erosion control shall be per Buncombe County Standards and Specifications

## CONSTRUCTION SEQUENCE

1. Obtain a Land Disturbing Permit from Buncombe County
2. Attend a pre–construction meeting with the Buncombe County and the Engineer
3. Install Construction Entrance / Exits
4. Install all perimeter devices such as silt fence.
5. Install all temporary sediment traps.
6. Have the site inspected by a Buncombe County inspector and the engineer prior to proceeding.
7. Begin mass grading the site.
8. Maintain Erosion Control devices as need.
9. Install storm drainage system and inlet and outlet protection devices simultaneously.
10. Stabilize site as areas are brought to finished grade.
11. Provide temporary and permanent seeding per details and specifications.
12. Remove all temporary measures upon site stabilization and call for final inspection.
13. Once a good stand of grass is established, clean out sediment traps and convert in to rain garden as shown in the details.

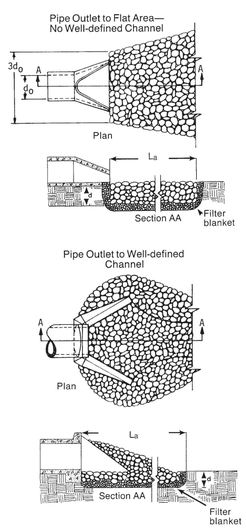
## STORMWATER NOTES

1. Stream delineation for the entire site was performed by _____.
2. Existing Impervious Area: 1.84 ac.
3. Total Impervious Area upon completion: 5.76 ac.
4. New Impervious Area includes all road, driveway and rooftop areas. Each lot is assumed to have 1400 square feet of driveway and 2,600 square feet of roof, and hardscape areas.
5. All storm drainage piping shall be double wall HDPE, and installed per Buncombe County, and manufacturer's Standards and Specifications.
6. Pipe material shall meet the product specifications of ASTM F667 and shall have smooth interior.
7. All storm drainage inlets shall be per Buncombe County Standards and Specifications.
8. Minimum cover on storm sewer pipe shall be 2.0 feet.
9. The contractor shall pre–set all manhole covers, catch basin grates and other utility access covers to finish pavement surface or sidewalk grade.

3 GRADING AND EROSION CONTROL NOTES

SCALE= NTS

6




Notes

1. La is the length of the riprap apron.
2. d = 1.5 times the maximum stone diameter but not less than 6".
3. In a well-defined channel extend the apron up the channel banks to an elevation of 6' above the maximum tailwater depth or to the top of the bank, whichever is less.
4. A filter blanket or filter fabric should be installed between the riprap and soil foundation.

Figure 6.41c Riprap outlet protection (modified from Va SWCC).

6.41.4 Rev. 6/06

4 OUTLET PROTECTION

SCALE= NTS

*Practice Standards and Specifications*

Design Criteria

| Summary: | Skimmer Sediment Basin |
|---|---|
| Primary Spillway: | Trapezoidal spillway with impermeable membrane |
| Maximum Drainage Area: | 10 acres |
| Minimum Volume: | 1800 cubic feet per acre of disturbed area |
| Minimum Surface Area: | 325 square feet per cfs of $Q_{25}$ peak inflow |
| Minimum L/W Ratio: | 2:1 |
| Maximum L/W Ratio: | 6:1 |
| Minimum Depth: | 2 feet |
| Dewatering Mechanism: | Skimmer |
| Minimum Dewatering Time: | 2 days |
| Baffles Required: | 3 baffles* (*Note: Basins less than 20 feet in length may use 2 baffles.) |

**Drainage areas**—Limit drainage areas to 10 acres.

**Design basin life**—Ensure a design basin life of 3 years or less.

**Dam height**—Limit dam height to 5 feet.

**Basin locations**—Select areas that:

- Provide capacity for storage of sediment from as much of the planned disturbed area as practical;
- Exclude runoff from undisturbed areas where practical;
- Provide access for sediment removal throughout the life of the project;
- Interfere minimally with construction activities.

**Basin shape**—Ensure that the flow length to basin width ratio is at least 2:1 to improve trapping efficiency. Length is measured at the elevation of the principal spillway.

**Storage volume**—Ensure that the sediment storage volume of the basin, as measured to the elevation of the crest of the principal spillway, is at least 1,800 cubic feet per acre for the disturbed area draining into the basin (1,800 cubic feet is equivalent to half an inch of sediment per acre of basin disturbed area).

Remove sediment from the basin when approximately one-half of the storage volume has been filled.

**Spillway capacity**—The spillway system must carry the peak runoff from the 10-year storm with a minimum 1 foot of freeboard in the spillway. Base runoff computations on the disturbed soil cover conditions expected during the effective life of the structure.

**Sediment cleanout elevation**—Determine the elevation at which the invert of the basin would be half-full. This elevation should also be marked in the field with a permanent stake set at this ground elevation (not the top of the stake).

Rev. 5/13 6.64.5

*Practice Standards and Specifications*

- Dewatering Allow the maximum reasonable detention period before the basin is completely drawn-out (at least 48 hours).
- Inflow rate Reduce the inflow velocity and divert all sediment-free runoff.

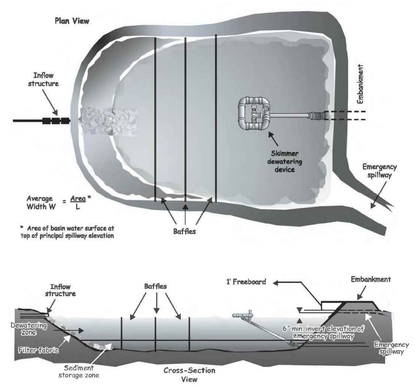



Figure 6.64c Example of a sediment basin with a skimmer outlet and emergency spillway. From Pennsylvania Erosion and Sediment Pollution Control Manual, March, 2000.

Rev. 5/13 6.64.7

5 SKIMMER BASIN

SCALE= NTS

| No. | REVISIONS/SUBMISSIONS | Date |
|---|---|---|
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BUNCOMBE COUNTY NORTH CAROLINA

Project No: 412415

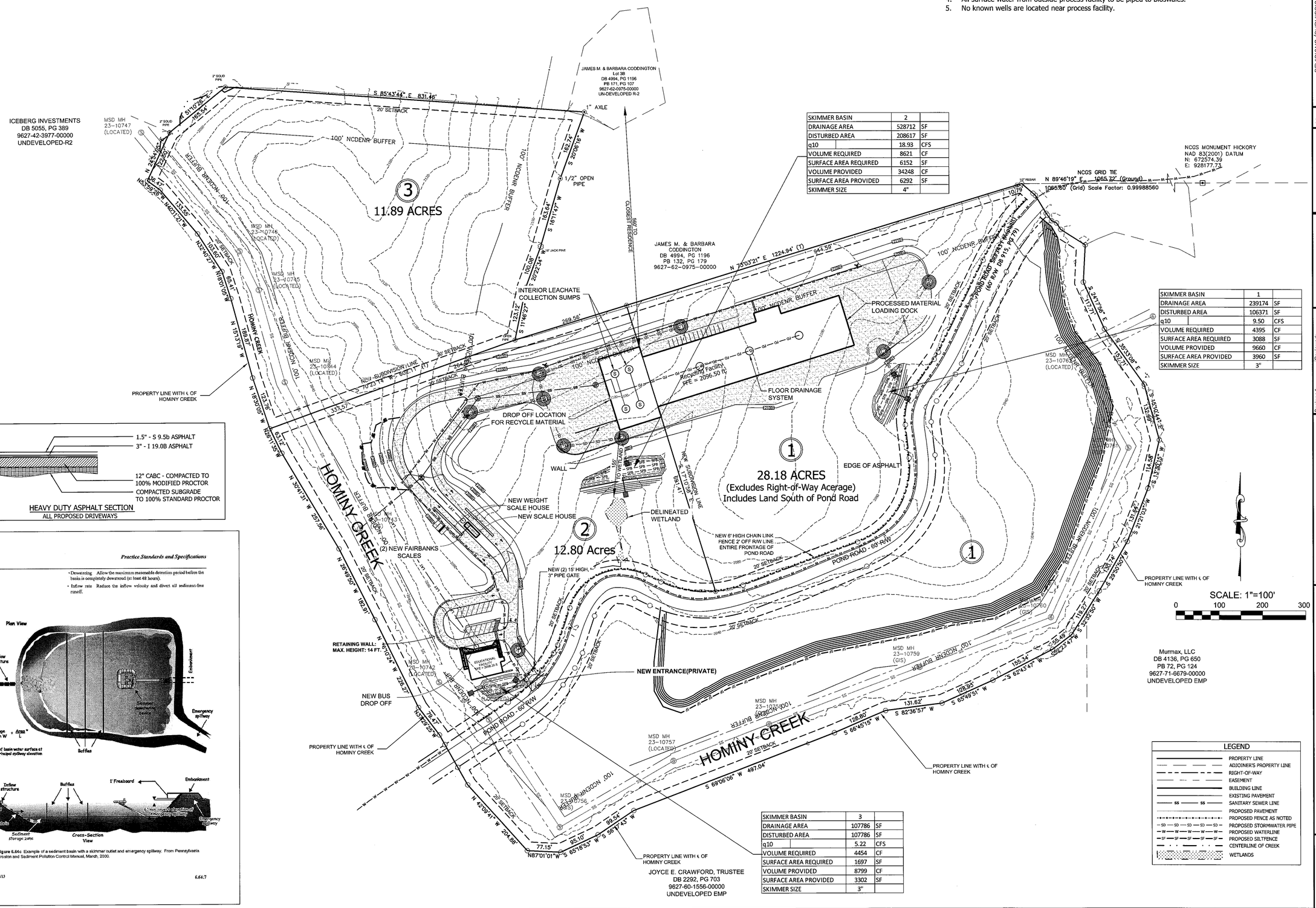
C-7.1

Drawing Title: EROSION CONTROL DETAILS

## FIGURE 5: ENGINEERING SITE PLAN

GENERAL NOTES:

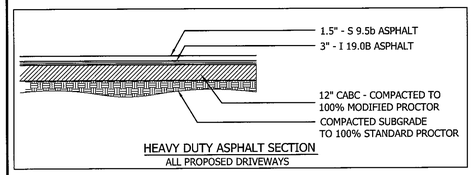
1. All recycleable storage areas are to be inside proposed process facility.
2. All waste handling areas are to be inside proposed process facility.
3. All process facility leachate and runoff to be collected and piped to MSD sewer line.
4. All surface water from outside process facility to be piped to Bioswales.
5. No known wells are located near process facility.




| SKIMMER BASIN | 2 | |
|---|---|---|
| DRAINAGE AREA | 528712 | SF |
| DISTURBED AREA | 208617 | SF |
| q10 | 18.93 | CFS |
| VOLUME REQUIRED | 8621 | CF |
| SURFACE AREA REQUIRED | 6152 | SF |
| VOLUME PROVIDED | 34248 | CF |
| SURFACE AREA PROVIDED | 6292 | SF |
| SKIMMER SIZE | 4" | |

| SKIMMER BASIN | 1 | |
|---|---|---|
| DRAINAGE AREA | 239174 | SF |
| DISTURBED AREA | 106371 | SF |
| q10 | 9.50 | CFS |
| VOLUME REQUIRED | 4395 | CF |
| SURFACE AREA REQUIRED | 3088 | SF |
| VOLUME PROVIDED | 9660 | CF |
| SURFACE AREA PROVIDED | 3960 | SF |
| SKIMMER SIZE | 3" | |

| SKIMMER BASIN | 3 | |
|---|---|---|
| DRAINAGE AREA | 107786 | SF |
| DISTURBED AREA | 107786 | SF |
| q10 | 5.22 | CFS |
| VOLUME REQUIRED | 4454 | CF |
| SURFACE AREA REQUIRED | 1697 | SF |
| VOLUME PROVIDED | 8799 | CF |
| SURFACE AREA PROVIDED | 3302 | SF |
| SKIMMER SIZE | 3" | |




HEAVY DUTY ASPHALT SECTION
ALL PROPOSED DRIVEWAYS

*Practice Standards and Specifications*

- Dewatering Allow the maximum reasonable detention period before the basin is completely dewatered (at least 48 hours).
- Inflow rate Reduce the inflow velocity and divert all sediment-free runoff.

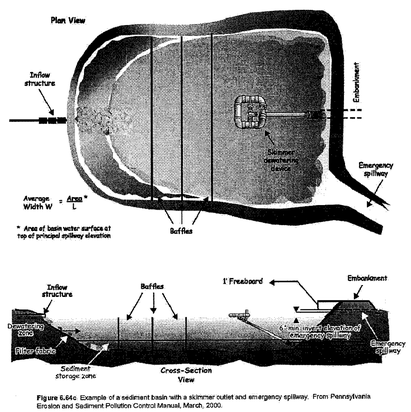



Figure 6.64c Example of a sediment basin with a skimmer outlet and emergency spillway. From Pennsylvania Erosion and Sediment Pollution Control Manual, March, 2000.

Rev. 5/13 6.64.7

| No. | REVISIONS/SUBMISSIONS | Date |
|---|---|---|
| | | |

Revision/Submission number with a triangle indicates changes made on this sheet

PERMIT DOCUMENTS

Designed: TMM
Drawn: GLW
Checked: TMM
Reviewed: TMM
Scale: AS NOTED
Date: 03-05-15


BROOKS ENGINEERING ASSOCIATES
17 Arlington Street
Asheville, N.C. 28801
Phone: 1-828-232-4700
Fax: 1-828-232-1331
www.brooksea.com
Planning • Engineering • Surveying • Environmental Services •


REGIONAL RECYCLING SOLUTIONS
BC RECYCLING CENTER
BUNCOMBE COUNTY NORTH CAROLINA

Project No: 412415
EV-1.0
Drawing Title: NCDENR SOLID WASTE PLAN

# ATTACHMENTS

1. Current Deed
2. USACOE Jurisdictional Determination Request

4

4

Doc ID: 023029430004 Type: CRP
Recorded: 08/20/2010 at 10:51:30 AM
Fee Amt: $28.00 Page 1 of 4
Revenue Tax: $0.00
Workflow# 0000037130-0005
Buncombe County, NC
Otto W. DeBruhl Register of Deeds
BK 4809 PG 750-753

# NORTH CAROLINA SPECIAL WARRANTY DEED

Excise Tax: 0.00

Parcel Identifier No. 9627-61-0961-00000 Verified by _____ County on the ____ day of_____, 20__.
By:

Mail/Box to: Harris M. Livingstain, ROD Box 31

This instrument was prepared by: Sarah Sparboe Thornburg, McGuire, Wood & Bissette, P.A.

Brief description for the Index: **54 acres +/-, Lower Hominy Twp.**

THIS DEED made the ____ day of _____, 2010, by and between

| GRANTOR | GRANTEE |
|---|---|
| **JULIA M. HIPPS AND HUGH H. DELOZIER, JR., CO-TRUSTEES OF "DECEDENT'S TRUST B" (A/K/A "KATHRYN H. TRUEBLOOD TRUST B") UNDER THE TRUEBLOOD FAMILY TRUST U/A DATED DECEMBER 29, 1994**<br><br>***9883 Oak Ridge Drive***<br>**Zionsville, IN 46077** | **JULIA M. HIPPS, married**<br><br>9883 Oak Ridge Drive<br>~~Zionsville, Indiana~~ 46077 |

The designation Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine or neuter as required by context.

WITNESSETH, that the Grantor, for a valuable consideration paid by the Grantee, the receipt of which is hereby acknowledged, has and by these presents does grant, bargain, sell and convey unto the Grantee **all of the Grantor's 56% undivided interest** in and to that certain lot or parcel of land situated in the City of Asheville, Buncombe County, North Carolina and more particularly described as follows:

**BEING all of the approximately 54 acre tract or parcel of land described in the deed into Kathryn Hipps Trueblood dated December 19, 1967, and recorded in the Office of the Register of Deeds for Buncombe County, North Carolina, in Deed Book 972, Page 519, reference to which deed is hereby made for a more particular description of said tract or parcel of land.**

The property hereinabove described was acquired by Grantor by instrument recorded in Book 4713, Page 1097, Buncombe County Registry.

All or a portion of the property herein conveyed ___ includes or _X_does not include the primary residence of a Grantor.

TO HAVE AND TO HOLD the aforesaid lot or parcel of land and all privileges and appurtenances thereto belonging to the Grantee in fee simple.

And the Grantor covenants with the Grantee, that Grantor has done nothing to impair such title as Grantor received, and Grantor will warrant and defend the title against the lawful claims of all persons claiming by, under or through Grantor, except for the exceptions hereinafter stated.

Title to the property hereinabove described is subject to the following exceptions:

**Easements, restrictions, rights of way of record and ad valorem taxes not yet due and payable.**

IN WITNESS WHEREOF, the Grantor has hereunto set his hand and seal, or if corporate, has caused this instrument to be signed in its corporate name by its duly authorized officers and its seal to be hereunto affixed by authority of its Board of Directors, the day and year first above written.

_____(SEAL))
**JULIA M. HIPPS, CO-TRUSTEE OF "DECEDENT'S TRUST B" (A/K/A "KATHRYN H. TRUEBLOOD TRUST B") UNDER THE TRUEBLOOD FAMILY TRUST U/A DATED DECEMBER 29, 1994**

Hugh H. DeLozier Jr. (SEAL))
**HUGH H. DELOZIER, JR., CO-TRUSTEE OF "DECEDENT'S TRUST B" (A/K/A "KATHRYN H. TRUEBLOOD TRUST B") UNDER THE TRUEBLOOD FAMILY TRUST U/A DATED DECEMBER 29, 1994**

**PLEASE DO NOT WRITE OR STAMP OUTSIDE THE BORDER**

**SEAL-OR STAMP**

STATE OF INDIANA

COUNTY OF MARION

I certify that the following person(s) personally appeared before me this day, each acknowledging to me that he or she voluntarily signed the foregoing document for the purposes stated therein and in the capacity indicated: **JULIA M. HIPPS, CO-TRUSTEE OF "DECEDENT'S TRUST B" (A/K/A "KATHRYN H. TRUEBLOOD TRUST B") UNDER THE TRUEBLOOD FAMILY TRUST U/A DATED DECEMBER 29, 1994.**

My commission expires:

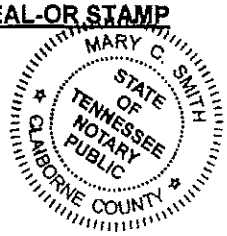
_____

This the _____ day of _____, 2010.

_____
Notary Public
Notary's printed or typed name:

_____

**SEAL-OR STAMP**




My commission expires:

3-20-2012

STATE OFTENNESSEE

COUNTY OF CLAIBORNE

I certify that the following person(s) personally appeared before me this day, each acknowledging to me that he or she voluntarily signed the foregoing document for the purposes stated therein and in the capacity indicated: **HUGH H. DELOZIER, JR., CO-TRUSTEE OF "DECEDENT'S TRUST B" (A/K/A "KATHRYN H. TRUEBLOOD TRUST B") UNDER THE TRUEBLOOD FAMILY TRUST U/A DATED DECEMBER 29, 1994.**

This the 7th day of July, 2010.

Mary Smith
Notary Public
Notary's printed or typed name:

Mary Smith

ND: 4825-0739-2261, v. 1

The property hereinabove described was acquired by Grantor by instrument recorded in Book 4713, Page 1097, Buncombe County Registry.

All or a portion of the property herein conveyed ___ includes or _X_ does not include the primary residence of a Grantor.

TO HAVE AND TO HOLD the aforesaid lot or parcel of land and all privileges and appurtenances thereto belonging to the Grantee in fee simple.

And the Grantor covenants with the Grantee, that Grantor has done nothing to impair such title as Grantor received, and Grantor will warrant and defend the title against the lawful claims of all persons claiming by, under or through Grantor, except for the exceptions hereinafter stated.

Title to the property hereinabove described is subject to the following exceptions:

- **That certain deed of trust executed in favor of Vonnie Financial Partners, LLC, and recorded on August 10, 2009, in Book 4713, Page 1101, Buncombe County Registry.**
- **Easements, restrictions, rights of way of record and ad valorem taxes not yet due and payable.**

IN WITNESS WHEREOF, the Grantor has hereunto set his hand and seal, or if corporate, has caused this instrument to be signed in its corporate name by its duly authorized officers and its seal to be hereunto affixed by authority of its Board of Directors, the day and year first above written.

Julia M Hipps, Co-Trustee (SEAL))
**JULIA M. HIPPS, CO-TRUSTEE OF "DECEDENT'S TRUST C" (A/K/A "KATHRYN H. TRUEBLOOD TRUST C") UNDER THE TRUEBLOOD FAMILY TRUST U/A DATED DECEMBER 29, 1994**

_____(SEAL))
**HUGH H. DELOZIER, JR., CO-TRUSTEE OF "DECEDENT'S TRUST C" (A/K/A "KATHRYN H. TRUEBLOOD TRUST C") UNDER THE TRUEBLOOD FAMILY TRUST U/A DATED DECEMBER 29, 1994**

**PLEASE DO NOT WRITE OR STAMP OUTSIDE THE BORDER**

**SEAL-OR STAMP**

STATE OF INDIANA

COUNTY OF MARION

I certify that the following person(s) personally appeared before me this day, each acknowledging to me that he or she voluntarily signed the foregoing document for the purposes stated therein and in the capacity indicated: **JULIA M. HIPPS, CO-TRUSTEE OF "DECEDENT'S TRUST C" (A/K/A "KATHRYN H. TRUEBLOOD TRUST C") UNDER THE TRUEBLOOD FAMILY TRUST U/A DATED DECEMBER 29, 1994.**

This the 26 day of JULY, 2010.

My commission expires:
12/05/2013

Notary Public
Notary's printed or typed name:

JEFFREY A. SPRINGER
Notary Public
State of Indiana
Hamilton County
My Commission Expires 12/05/2013

ClearWater

ClearWater Environmental Consultants, Inc.
www.cwenv.com

February 13, 2015

Ms. Tasha Alexander
US Army Corps of Engineers
Asheville Regulatory Field Office
151 Patton Avenue, Room 208
Asheville, North Carolina 28801-2638

**RE: Regional Recycling Solutions (+/- 35 acres)**
**Jurisdictional Determination**
**Buncombe County, North Carolina**

Dear Ms. Alexander,

The attached Jurisdictional Determination request is being submitted on behalf of Regional Recycling Solutions. The project site is located off Pond Road in Buncombe County, North Carolina.

Please do not hesitate to contact me at 828-698-9800 if you have any questions or comments.

Sincerely,

Kevin Mitchell
Biologist

R. Clement Riddle, P.W.S.
Principal

224 South Grove Street, Suite F
Hendersonville, NC 28792
828-698-9800 Tel
828-698-9003 Fax

ClearWater

Department of the Army
Wilmington District, Corps of Engineers
Attn: Scott McLendon, Chief Regulatory Division
PO Box 1890
Wilmington, NC 28402-1890

NCDENR
NC DWR, Webscape Unit
Attn: Karen Higgins
512 North Salisbury Street
Raleigh, North Carolina 27604

I, the current landowner/managing partner of the property identified below, hereby authorize ClearWater Environmental Consultants, Inc. (CEC) to act on my behalf as my agent during the processing of jurisdictional determination requests and permits to impact Wetlands and Water of the US subject to Federal jurisdiction under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899. CEC is authorized to provide supplemental information as needed at the request of the USACE or DWR.

Additionally, I authorize representatives of the Wilmington District, US Army Corps of Engineers to enter upon the property herein described for the purposes of conducting on-site investigations and issuing a determination associated with Wetlands and Waters of the US subject to Federal jurisdiction under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899.

Property Owner of Record: Julia M. Hipps

Property Owner of Address: Julia M. Hipps
9883 Oak Ridge Dr.
Zionsville, Indiana 46077

Phone Number: 317-442-3960 cell

Property Location: 54 acres +/- Pond Rd. Asheville, NC *

Owner/Managing Partner Printed Name: Julia M. Hipps

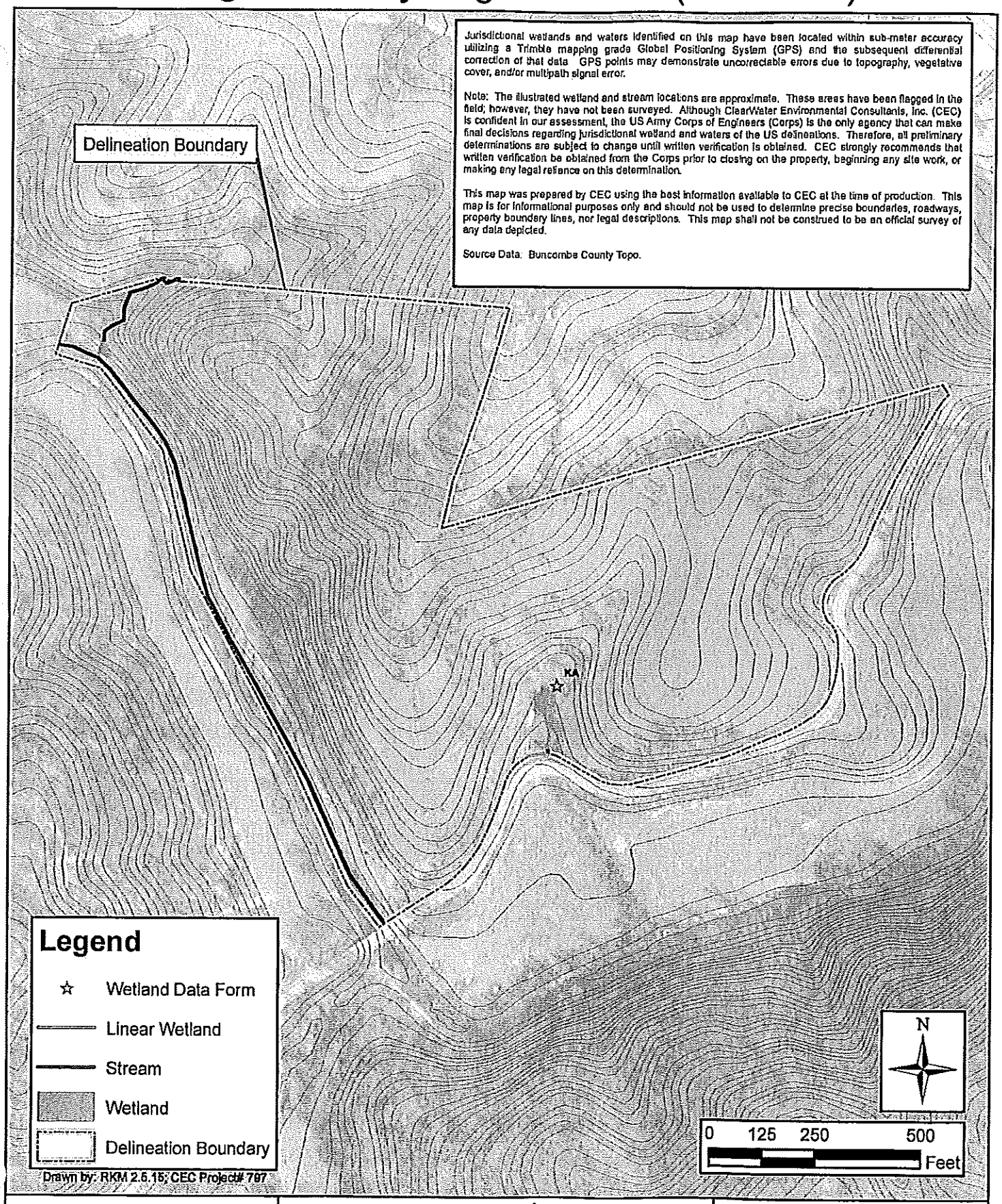
Owner/Managing Partner Signature: x Julia M. Hipps

Date: x Feb 4, 2015

* Pin # 9627-61-0961

224 South Grove Street, Suite F
Hendersonville, NC 28792
Phone: 828-698-9800
www.cwehv.com

# Regional Recycling Solutions (+/- 35 AC)




Jurisdictional wetlands and waters identified on this map have been located within sub-meter accuracy utilizing a Trimble mapping grade Global Positioning System (GPS) and the subsequent differential correction of that data. GPS points may demonstrate uncorrectable errors due to topography, vegetative cover, and/or multipath signal error.

Note: The illustrated wetland and stream locations are approximate. These areas have been flagged in the field; however, they have not been surveyed. Although ClearWater Environmental Consultants, Inc. (CEC) is confident in our assessment, the US Army Corps of Engineers (Corps) is the only agency that can make final decisions regarding jurisdictional wetland and waters of the US delineations. Therefore, all preliminary determinations are subject to change until written verification is obtained. CEC strongly recommends that written verification be obtained from the Corps prior to closing on the property, beginning any site work, or making any legal reliance on this determination.

This map was prepared by CEC using the best information available to CEC at the time of production. This map is for informational purposes only and should not be used to determine precise boundaries, roadways, property boundary lines, nor legal descriptions. This map shall not be construed to be an official survey of any data depicted.

Source Data: Buncombe County Topo.

| | | |
|---|---|---|
| Buncombe County, North Carolina | ClearWater<br>224 South Grove Street, Suite F<br>Hendersonville, North Carolina 28792 | Stream & Wetland Delineation<br>Delineated February 4, 2015<br>Figure 5 |