APPLICATION FOR HEARING
BOARD OF ZONING APPEALS
OAK HILL, TENNESSEE

Application Date: January 11, 2024 **BZA Meeting Date:** February 20, 2024

The undersigned hereby requests consideration for a hearing on the zoning regulations for property noted below in accordance with plans, application, fee, and all data heretofore filed, all of which are attached and made a part of this initial appeal.

Property Address: 4815 Franklin Pike, Nashville, TN 37220 **Zone District:** CUP-D

Is this application a request to either obtain a new Commercial Use Permit (CUP) or to change an existing CUP? Yes X **No** ____

Description of Request(s) *(for Residential - if encroaching into setback, specify measurement of encroachment in number of feet/inches):*

Requesting Master Plan approval including: inclusion of approved plat for addition of 850 Tyne Blvd. (approved in 2019); new athletic field, pavilion, along north property line in the northwest area of the property; new barn and paddocks in the southwest area of the property; and drainage improvements including low-impact treatment measures. No field-lighting or public-address system will be installed.

(THE FOLLOWING SECTION IS FOR RESIDENTIAL VARIANCE REQUESTS ONLY)

Lot Area: _____s.f.

Lot Coverage: _____s.f. → which equals _____% of Lot Area *(noted above)*
(total existing & proposed impervious surfaces on lot – ie: roofs, concrete driveways/patios/walks/pool decks, etc.)

Heat/Cooled Area: _____s.f. → which equals _____% of Lot Area

Proposed Height: _____feet / _____stories

Lot Depth/Width Ratio: _____ *(maximum ratio allowed is 4:1 for all Zones)*
(Lot width is measured at the narrowest point of the lot, and lot depth is measured at the deepest point of the lot)

Avg. front setback of 4 adjacent homes: _____feet *(if applicable)*

(THE FOLLOWING SECTION IS FOR RESIDENTIAL VARIANCE REQUESTS ONLY)

Based on the powers and jurisdiction of the Board of Zoning Appeals as set forth in the Zoning Ordinance, a variance is hereby requested as applied to this property. The undersigned understands that the BZA reviews all cases with respect to the following hardship standards, and that it is incumbent upon the applicant to present the manner in which each of these hardships compel the applicant to request this variance.
These hardships do not apply to Conditional Use Permits.

1. ***The particular physical surroundings, shape, or topographic conditions of the specific property involved that would result in a particular hardship upon the owner as distinguished from a mere inconvenience, if the strict application of this chapter were carried out must be stated.***
2. ***The conditions upon which the petition for a variance is based would not be applicable, generally, to other property within the same district.***
3. ***The variance will not authorize activities in a zone district other than those permitted by this chapter.***
4. ***Financial returns only shall not be considered as a basis for granting a variance.***
5. ***The alleged difficulty or hardship has not been created by any person having an interest in the property after the effective date of this chapter (Ord. #12-16, Jan. 2013)***
6. ***That granting the variance requested will not confer on the applicant any special privilege that is denied to other lands, structures, or buildings in the same districts.***
7. ***The variance is the minimum variance that will make possible the reasonable use of the land, building, or structure.***
8. ***The granting of the variance will not be detrimental to the public welfare or injurious to other property or improvements in the area in which the property is located.***
9. ***The proposed variance will not impair an adequate supply of light and air to adjacent property, substantially increase the congestion in the public streets, increase the danger of fire, endanger the public safety, or substantially diminish or impair property values within the area.***

Eric Hawkins on behalf of Oak Hill School
Applicant Name

4815 Franklin Pike
Applicant Address

615.297.6544
Applicant Phone Number

ehawkins@hastingsarchitecture.com
Applicant Email Address

Stephen Snow
City of Oak Hill Code Compliance Officer

Applicant Signature

CASE NO. *(to be completed by City of Oak Hill)*

Holland & Knight

Nashville City Center | 511 Union Street, Suite 2700 | Nashville, TN 37219 | T 615.244.6380 | F 615.244.6804
Holland & Knight LLP | www.hklaw.com

Jon Cooper
+1 615-850-8550
Jon.Cooper@hklaw.com

March 4, 2024

Oak Hill Board of Zoning Appeals
5548 Franklin Pike, Suite 101
Nashville, TN 37210

Re: First Presbyterian Church and Oak Hill School Amendment to Conditional Use Permit and Inclusion of 850 Tyne Boulevard into CUP

Dear Members of the Board of Zoning Appeals:

As counsel for First Presbyterian Church (the "Church") and Oak Hill School (the "School"), we are submitting this letter in support of our client's request for an amendment to the existing conditional use permit (CUP) for the Church and School, as well as a request to incorporate the 850 Tyne Boulevard parcel into the CUP. As noted in the application submission letter from Hastings Architecture, the purpose of the CUP amendment is to upgrade the Long-Range Master Plan to locate the athletic field, pavilion, and equestrian facilities in essentially the same location as approved by the Oak Hill Board of Zoning Appeals (the "BZA") in February 2019 (hereinafter referred to as "The Project").

Pursuant to Section 14-113 of the City of Oak Hill Zoning Code (the "Zoning Code"), a conditional use permit is to be construed as synonymous with a special exception as authorized by Tenn. Code Ann. § 13-7-206. A special exception or CUP, unlike a variance, is not an exception to the Zoning Code. Rather, it is a use that is expressly permitted if the applicable conditions are met. Thus, the Board of Zoning Appeals (the "Board") must approve a CUP or amendment thereto if the Board determines that the conditions stated in the Zoning Code have been met. Demonbreun v. Metro. Bd. of Zoning Appeals, No. M2009-00557-COA-R3CV, 2011 WL 2416722, at *7 (Tenn. Ct. App. June 10, 2011). The law requires only a finding that the conditions stated in the ordinance have been met. Wright v. City of Shelbyville Bd. of Zoning Appeals, No. M2011-01446-COA-R3CV, 2012 WL 5378267, at *9 (Tenn. Ct. App. Oct. 31, 2012)

I. GENERAL CONDITIONS FOR CONDITIONAL USE PERMIT

Section 14-210 of the Zoning Code sets forth general conditions applicable to all conditional use permits.

> (a) A conditional use permit shall be granted by the BZA only after the applicant has demonstrated, and the BZA has determined, that all of the following required standards are met:
>
> > (1) The proposed use shall comply with all applicable regulations, including any specific standards for the proposed use set forth in this chapter. Any accessory use to a conditional use must receive express approval by the BZA;
> >
> > (2) The proposed use is so located, designed, and proposed to be operated so as not to endanger the public health, safety, and welfare; and
> >
> > (3) The proposed use is necessary for the public convenience.
>
> (b) Traffic impact study.

II. APPLICANT'S SATISFACTION OF GENERAL CUP CONDITIONS

General Condition (a)(1): The proposed use shall comply with all applicable regulations, including any specific standards for the proposed use set forth in this chapter. Any accessory use to a conditional use must receive express approval by the BZA.

As discussed more fully below, the Project meets the applicable regulations for a conditional use permit, as well as the specific standards applicable to churches and private schools. The existing CUP already approves the use of the property for a School, athletic field, and equestrian facilities. Thus, no additional accessory use is being requested.

A. Conditions Applicable to Private Schools Under Section 14-210:

(a) Nonprofit status.

The School has been registered with the Tennessee Secretary of State as a nonprofit public benefit corporation since 1962.

(b) Tax exempt status.

The School is exempt from property and income taxes as a nonprofit educational institution.

(c) Grade school requirements.

The School serves children from Pre-K through sixth grade in compliance with this requirement. The School only operates as an elementary school, similar to any public elementary school permitted to operate in Oak Hill.

(d) The school is constructed, conducted, maintained, and operated in accordance with the requirements of this chapter as to construction, maintenance, operation, health and safety provisions, etc.;

The School meets these requirements under the existing CUP. The Project will meet all requirements of the Oak Hill City Code pertaining to construction, maintenance, operation, health, and safety.

(e) The site on which the school is located contains at least two (2) acres for each fifty (50) pupils of anticipated enrollment; provided, that the property contain a minimum of six (6) acres of land for any combination of grades one through eight (1–8). Said site shall have a minimum of two hundred eighty feet (280') of frontage on a public right-of-way of a major street as shown on the official street classification plan;

The School has 532 students enrolled. The School and Church are located on one parcel of property consisting of 59.98 acres, which exceeds the minimum acreage requirements. The School has in excess of 800 feet of frontage along Tyne Boulevard.

(f) The off-street parking requirements set forth in §§ 14-235 and 14-236 can be met. No more than twenty-five percent (25%) of the total parking spaces may be located in the front yard, and the parking lots may encroach into the front setback by no more than thirty percent (30%) of the setback requirement. The parking lots may encroach into the 14-54 side and rear setbacks by no more than fifty percent (50%) of the setback requirement;

The Church and School meet these parking requirements under the existing CUP, and the Project will not cause the facilities to fall out of compliance.

(g) "All front, side, and rear yards shall be equal to two (2) times the yard requirements for the zoning district in which the public school is to be located;"

To the extent this condition applies to a private school, which is not specified in the Zoning Code, the Project satisfies the strictest interpretation of the Zoning Code setback provisions for zoning District D. Two times the yard requirements for District D would be 150 feet (front), 50 feet (side – accessory structure), and 140 feet (rear). The applicable setbacks are set forth in the following chart:

Requirement	A	B	C	D	E	F
Minimum Lot Area	10,000 SF	20,000 SF	1 Acre	2 Acre	3 Acre	4 Acre
Minimum Front Lot Line [1]	50 Feet	50 Feet	100 Feet	150 Feet	175 Feet	225 Feet
Maximum Lot Depth Lot Width Ratio [2]	4:1	4:1	4:1	4:1	4:1	4:1
Maximum Lot Coverage						
For Lots less than the Minimum Lot Area	4,000 sf	7,000 sf	13,000 sf	13,000 sf up to 25%	15,000 sf up to 20%	15,000 sf up to 20%
For Lots greater than the Minimum Lot Area	40% up to 6,000 sf	36% up to 9,000 sf	30% up to 18,000 sf	25% up to 25,000 sf	20% up to 35,000 sf	20% up to 37,000 sf
Maximum Gross Floor Area Ratio (FAR) FAR = Gross floor area / Lot area	24% with a Maximum of 3,600 sf	32% with a Maximum of 7,000 sf	18% with a Maximum of 10,000 sf	18% with a Maximum of 18,000 sf	14% with a Maximum of 18,000 sf	14% with a Maximum of 18,000 sf
Minimum Yard Requirements for Primary Structure						
Front Setback [3]	60 feet	60 feet	75 feet	75 feet	100 feet	150 feet
Side Setback: Interior lot line	10 feet	10 feet or 15% of front lot width, whichever is greater. Up to 15 feet	15 feet side yard or 20% of lot width, whichever is greater. Up to 30 feet	20 feet side yard or 22% of lot width, whichever is greater. Up to 35 feet	40 feet	50 feet
Side Setback: Side Street	30 feet	40 feet	40 feet	40 feet	40 feet	50 feet
Rear Setback	50 feet	40 feet	60 feet	70 feet	100 feet	100 feet
Maximum Primary Structure Height - Overall						
Maximum Stories	2 Floors. Second Floor shall be a Half Story.	2 floors	2 floors	2 floors	3 Floors. Third floor shall be a Half Story.	3 Floors. Third floor shall be a Half Story.
Maximum Height [4]	28 feet	Varies	Varies	Varies	42 Feet	42 Feet
Height Zone 1 Height Maximum	Not applicable	28 Feet	28 Feet	28 Feet	Not Applicable	Not Applicable
Height Zone 2 Height Maximum	Not applicable	32 Feet	36 Feet	40 Feet	Not Applicable	Not Applicable
Height Zone 3 Height Maximum [5]	Not applicable	28 Feet	28 Feet	Not Applicable	Not applicable	Not applicable
Minimum Yard Requirements for Accessory Structures, Pool Houses, Pools, and Pool Decks	A	B	C	D	E	F
Front Setback	Behind the Primary Structure	Behind the Primary Structure	Behind the Primary Structure	Behind the Primary Structure	Behind the Primary Structure	Behind the Primary Structure
Side Setback	10 feet	15 feet	15 feet	25 feet	25 feet	30 feet
Side Setback: Side Street	30 feet	40 feet	40 feet	40 feet	40 feet	50 feet
Rear Setback	20 feet	20 feet	30 feet	40 feet	50 feet	50 feet
Pool House	Maximum footprint of 25% of the Primary Structure	Maximum footprint of 25% of the Primary Structure	Maximum footprint of 25% of the Primary Structure	Maximum footprint of 25% of the Primary Structure	Maximum footprint of 25% of the Primary Structure	Maximum footprint of 25% of the Primary Structure
Maximum Height	25 feet & 1 floor	25 feet & 1 floor	25 feet & 1 floor	25 feet & 1 floor	25 feet & 1 floor	25 feet & 1 floor

Additional Regulations:

[1] Lots on cul-de-sacs are exempt from this provision; but must have a minimum front lot line of at least forth feet (40') feet measured along the curve at the edge of the right-of-way

[2] Lot width is measured at the narrowest point of the respective lot and lot depth is measured at the deepest point of the lot.
(Ord. #12-16, Jan. 2013, as amended by Ord. #0-17-08-01-90, Feb. 2017, and Ord. #O-18-02-02-90, Feb. 2018)

[3] Whichever is greater from this table or § 14-121(f)

[4] Flat Roof structures are permitted to be a maximum of one floor & 18 feet in accessory structures, Zone A, and in Height Zone 1 & 3, and a maximum of 2 floors in Height Zone 2, Zone E, and Zone F.

[5] Height Zone 3 is not applicable to lots with lot depths less than 200 feet.

(h) The school and all facilities are connected to the public sewer system;

The School is connected to the public sewer system.

(i) All plans and specifications for construction, establishment, and operation of a private school shall be approved by the city manager or designee as a part of the conditional use permit and said plans shall show future expansion, and a map showing the proposed location of the building(s), and the city manager or designee must approve all preliminary and final plans and specifications, and any change orders or alterations which affect space allotment, structure, or health and safety. Where new facilities are to be constructed, the city manager, or designee shall make such inspection as may be deemed necessary during construction of buildings to determine whether school facilities are being constructed in conformance with the approved final plans and building codes;

The Project will obtain all required plan approvals prior to the commencement of construction.

(j) All buildings shall meet all the requirements and standards for construction, repair, and equipment of public school buildings and operation of same established by the Tennessee State Board of Education governing new sites, new building, major

repairs, and equipment for public schools, including any subsequent amendments to said regulations, and said requirements, rules, and regulations are referred to and made a part of this chapter as fully as though copied herein.

The School's buildings currently meet all requirements of the Tennessee State Board of Education. The Project will not alter any of the existing buildings.

(k) "The parking lot for such facilities shall not exceed twenty-five percent [sic]."

This presumably means twenty-five percent of the lot area. The Project will not result in parking at the School exceeding twenty-five percent of the lot area.

B. <u>Conditions Applicable to Churches</u>

(a) Churches shall not be permitted unless the lot upon which it is to be located contains a minimum of six (6) acres. Said lot shall have a minimum of two hundred eighty feet (280') of frontage on a public right-of-way.

The Church property consists of 59.98 acres, which exceeds the minimum acreage requirements. The Church also has approximately 1,310 feet of frontage along Franklin Road and approximately 783 feet of frontage along Tyne Boulevard.

(b) The location, size, and design of the proposed church facilities shall be situated so that they are compatible with the surrounding area, thus reducing the impact upon such area; all structures shall be required to provide a front, side, and rear yard equivalent to two (2) times the requirement of the zoning district in which the church is proposed.

The Project has been designed to be compatible with the surrounding area. The Project will include ample landscape buffering to shield the Project as noted on the site plan.

Please see the response in Section II(A)(g) above regarding the setbacks.

(c) Church facilities shall be allowed to be located only on major streets as shown on the official street classification plan.

The Church is located on a major street, and there are no new points of ingress and egress associated with the Project.

(d) All bulk regulations of the district shall be met; provided, the height of all structures shall not exceed sixty feet (60'); provided further, steeples, copulas, and similar architectural treatments may exceed the height of the building by no more than fifty percent (50%) of 14-55 the height of the primary structure. Provided further, that for any church situated upon a lot of at least thirty (30) acres, the following requirements shall apply to each church structure situated more than two-hundred fifty feet (250') from the nearest lot line. The height of steeples, copulas, and

similar architectural treatments shall not exceed one hundred twenty feet (120') above the roof of the structure upon which such treatments are built.

The Project complies with these height requirements. The other provisions of subpart (d) are not applicable to the Project.

(e) The off-street parking requirements set forth in §§ 14-235 and 14-236 can be met. No more than twenty-five percent (25%) of the total parking spaces may be located in the front yard, and the parking lots may encroach into the front setback by no more than thirty percent (30%) of the yard requirement. The parking lots may encroach into the side and rear setback by no more than fifty percent (50%) of the setback requirement. The parking lot for such facilities shall not exceed twenty-five percent (25%) of the total lot area to be utilized.

The Church and School meet these parking requirements under the existing CUP, and the Project will not cause the facilities to fall out of compliance.

General Condition (a)(2): The proposed use is so located, designed, and proposed to be operated so as not to endanger the public health, safety, and welfare

The Project has been thoughtfully designed to protect and enhance public health, safety, and welfare. Further, over the past months, the Church and School have engaged in numerous discussions and one-on-one meetings with neighbors to show the thoughtful design of the Project and the benefits to the School, Church, and the neighborhood.

General Condition (a)(3): The proposed use is necessary for the public convenience.

The Project design includes new stormwater quality and quantity managements elements consisting of bioretention areas retaining walls that will result in a substantial reduction in the amount of runoff from the property. The Project also includes a robust landscaping plan.

General Condition (b): Traffic impact study.

Regarding the traffic impact study, as noted in the application letter from Hastings Architecture, the Church and School retained a transportation consultant to review and update the 2018 traffic study for this campus. The study results indicated that the Project will not cause any increase in traffic volume. A copy of the 2018 traffic study and the new Project update are included as attachments to the letter from Hastings Architecture.

III. INCLUSION OF 850 TYNE BOULEVARD

The BZA approved the plat for the property in February 2019. The final plat showing the inclusion of 850 Tyne Boulevard was submitted to the City Engineer on October 10, 2022 in advance of the November 1, 2022 Planning Commission meeting. The Church and School were told at the November 1, 2022 Planning Commission meeting that they needed to have the inclusion of 850 Tyne Boulevard approved by the BZA. Thus, along with the amendment to the CUP discussed above, the Church and School are requesting the inclusion of 850 Tyne Boulevard as part of the CUP.

IV. CONCLUSION

In sum, the Church and School have gone to great lengths to design a project that is sensitive to the natural features of the property and to the neighborhood impact. For all of the above reasons, we are respectfully requesting your approval of the amendment to the CUP and the inclusion of 850 Tyne Boulevard as part of the CUP.

Sincerely,

Jon Cooper

Attachments

HASTINGS

5 March 2024

Chris Taylor, Chairman
City of Oak Hill
5548 Franklin Pike, Suite 101
Oak Hill, TN 37220

RE: First Presbyterian Church & Oak Hill School Conditional Use Permit Amendment

Dear Chairman Taylor,

We are pleased to provide this letter on behalf of First Presbyterian Church and Oak Hill School. This document is intended to accompany the visual exhibits we are submitting in preparation for our appearance before the Board of Zoning Appeals on March 19, 2024.

A) We are requesting to update the Conditional Use Permit Master Plan to include a regulation-size, 8-lane track, athletic field with synthetic turf, and a viewing pavilion on the north portion of the campus in a similar location to what was previously approved in February 2019. A new barn and fenced riding areas in the rear yard will be located at the southwest quadrant of the plan (previously 850 Tyne Blvd). Each of the uses described above already exist on the property.
    a. The new track is positioned to mitigate the falling grade across the site while respecting the existing detention pond to the west.
    b. A robust landscape zone to the north of the track and field will provide a buffer between the campus and the neighbors to the north.
    c. A fence will be constructed around the perimeter of the track to enhance safety.
    d. A viewing pavilion offers shade and protection from inclement weather.
    e. No amplified public address system will be installed.
    f. Lighting for athletic events is not proposed.
    g. Drainage strategies have been improved, significantly reducing the area of water that flows toward the north by introducing additional subgrade piping below the field and low-impact design measures.
    h. New equestrian barn, fenced horse riding area, and fenced area to be located at 850 Tyne portion of property.

B) Inclusion of 850 Tyne Blvd into CUP.
    a. BZA previously approved the inclusion of the 850 Tyne Blvd into the CUP on February 19, 2019 (meeting minutes attached).
    b. Final Plat was previously submitted to the City Engineer on October 12, 2022.

Our team has met with each of the neighbors whose properties abut the campus to the north to discuss the proposed design.

We are excited about the opportunity to present this request to the BZA.

HASTINGS Architecture, LLC
225 Polk Avenue Suite 100
Nashville TN 37203

615.329.1399
hastingsarchitecture.com

EXHIBITS

- Letter of support
- Traffic Impact Study from 2018
- Meeting Minutes February 19, 2019
- Final Plat dated October 4, 2022
- Update to CUP Long-Range Masterplan (previously approved by the BZA February 19, 2019)
- Architectural Site Plan
- Architectural Floor Plans
- Architectural Elevations
- Renderings
- Civil Site Plans
- Civil Grading Plans
- Civil Drainage Exhibits

Thank you for your time and consideration.

Best Regards,
HASTINGS Architecture, LLC

William Hastings
Principal

Enclosures

HASTINGS Architecture, LLC
225 Polk Avenue Suite 100
Nashville TN 37203

615.329.1399
hastingsarchitecture.com

January 11, 2024

City of Oak Hill
Board of Zoning Appeals
Chris Taylor, Chairman
5548 Franklin Pike
Number 102
Nashville, Tennessee 37220

Chairman Taylor,

As a proud resident of Oak Hill and a father of an Oak Hill School graduate, I am writing to tell you why I am supportive of adding a track and field facility there.

As a parent, I am grateful that Oak Hill School considers the development of the student as a whole - not just in the classroom. My daughter Lilly attended the Oak Hill School before going onto Harpeth Hall Academy, and my wife Jennifer and I will always be grateful for the education Lilly received at Oak Hill.

Any parent will tell you that children spend entirely too much time indoors when they could be participating in extracurricular activities outside. Now more than ever, sports provide a necessary outlet for our children. Oak Hill School has always understood - and worked to ensure - that learning happens outside the confines of a classroom, and as a parent, that's critically important to me.

Our daughter thrived at Oak Hill and benefited immensely from their sports programs. It's very difficult to drag her off the soccer field, and I believe that she would have benefited immensely from a track and field facility. While we often talk about the skills our children learn from team sports, there are also tremendous values for them in individual sports, like track and field, that require a unique facility to participate in. Oak Hill School would benefit tremendously from adding a new facility because it would elevate the school's athletics program. Additionally, this new facility would provide greater safety and security for the Oak Hill School's campus.

As an Oak Hill resident who lives just down the street from the school, I've appreciated how the church and school leaders have worked in concert with the surrounding neighborhood. These can be difficult issues to navigate, but I'm grateful that Oak Hill School has been so willing to listen and cooperate and has offered many opportunities to do so. Oak Hill and the church have been thoughtful in considering neighbors in placement and design, and they are to be commended for these efforts.

I ask you to support the addition of a field facility at Oak Hill School. I can tell you that it would be a tremendous benefit to generations of Oak Hill students to come. I hope you won't hesitate to reach out if I can be helpful in any way.

Thank you,
Ward Baker

CITY OF OAK HILL, OAK HILL, TENNESSEE
BOARD OF ZONING APPEALS MEETING MINUTES
February 19, 2019

The Board of Zoning Appeals of the City of Oak Hill, Tennessee met at the Oak Hill City Hall. Those present were Vice Chairman Chris Taylor, Members Mary Catherine Bradshaw and Emmie Thomas. Also present, City Manager Jeff Clawson, Code Compliance Officer Monty Kapavik and Administrative Assistant Victoria Talbott.

1. **Meeting Called to Order:** The meeting was called to order at 5:00 p.m.

2. **Introductions**

3. **Pledge of Allegiance**

4. **Approval of Minutes**
   A motion was made by Mary Catherine Bradshaw, seconded by Chris Taylor, to approve the minutes of the January 15, 2019 meeting. Motion carried 3-0.

5. **Case Z-19-04: 4815 Franklin Pike – CUP Change & Update Master Plan**
   a. First Presbyterian/Oak Hill School has requested that property recently acquired (850 Tyne) be added to the current Conditional Use Permit and incorporated in to the existing Master Plan. Motion was made by Chris Taylor, seconded by Mary Catherine Bradshaw, to authorize the inclusion of 850 Tyne to the existing Conditional Use Permit and the existing Master Plan. Motion carried 3-0.

   b. First Presbyterian/Oak Hill School was in attendance to present an update to their Master Plan. A motion was made by Chris Taylor, seconded by Mary Catherine Bradshaw, to approve an upgrade to the Master Plan as presented. This approval should not be deemed to make changes to any stormwater plan. Any **proposed construction plans** or **proposed** changes to the stormwater plan must be approved by the Oak Hill Planning Commission at a public meeting with citizens guaranteed the right to be heard, prior to Planning Commission **approval and prior to a building permit to be issued**. Motion carried 3-0.

6. **Case Z-19-07: 4005 Newman Place – Garage**
   Bim Glasgow representing the Carpenters (Owners of 4005 Newman Place)presented a request for a variance to convert their existing carport into a

garage. A public hearing was held. A motion was made by Mary Catherine Bradshaw, seconded by Emmie Thomas, to approve a 22 foot 5 inch rear yard setback variance to accommodate the change. The motion is based on the fact that the variance will not be detrimental to the public welfare or injurious to other properties or improvements in the area and that the variance is the minimum variance that will make possible the reasonable use of the land. Motion carried 3-0.

7. **Case Z-19-09: 4117 Crestridge – House Rebuild**
Kevin D representing Robin Barrick (Owner of 4117 Crestridge) presented a request for a front yard setback variance to rebuild his home damaged by fire. A public hearing was held. A motion was made by Chris Taylor, seconded by Emmie Thomas, to approve a front yard setback of 12 feet based on the 90% rule, making the new setback 80 feet. Motion carried 3-0.

8. **Case Z-19-08: 1161 Sewanee – Pool**
Rick and Vaughn Sinclair (Owners of 1161 Sewanee) were present to request a variance to build a pool in their side yard, with a variance of 10 feet in their front yard to accommodate this request. The current house is non-conforming and the new front yard setback variance will not increase the non-conformity. A public hearing was held. A motion was made by Mary Catherine Bradshaw, seconded by Emmie Thomas to approve a variance to allow for the construction of a pool in the side yard as well as a front yard setback variance of 10 feet to accommodate the pool construction. Motion carried 3-0.

9. **Ordinance O-19-04-01-90 Narrowing Setbacks**
This Ordinance is designed to require future proposed subdivision plat changes to be evaluated by the Board of Zoning Appeals prior to the Planning Commission review, to ensure that no boundary properties are adversely affected by the proposed plat. The BZA will review and discuss at their March meeting.

9. **Election of Officers**
This item was deferred to the March BZA meeting when all 5 members are expected to be present.

10. **Adjourn**: The meeting was adjourned at 6:37 p.m.

John C. Taylor
Vice Chairman

Member

MEMORANDUM

To: First Presbyterian Church and Oak Hill School

From: Tyler Fosnes, P.E., KCI Technologies, Inc.

Re: **First Presbyterian Church and Oak Hill School TIS – Addendum Memo**

Date: January 12, 2024

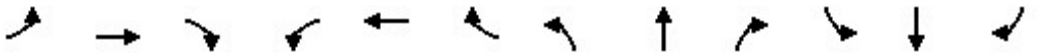
The purpose of this memo is to confirm that the traffic impact study (TIS) for the proposed First Presbyterian Church and Oak Hill School master plan is still applicable after recent updates to the site plan. KCI Technologies, Inc. prepared a TIS for the proposed master plan in December 2018. This memo will verify that the results of the December 2018 TIS are still valid.

After a comparison of the analyses from the December 2018 TIS and the new site plan, it was determined that the impact on traffic patterns will be minimal due to the modification. Furthermore, additional analysis was conducted to evaluate a change in distribution that may occur. Capacity analysis was conducted at the intersection of Franklin Pike and Tyne Boulevard with the modified distribution. To account for the possible change, 15% of entering and exiting traffic volumes from Site Access 1 were re-distributed to the intersection of Franklin Pike and Tyne Boulevard. It should be noted that the capacity analysis was conducted for the weekday PM peak hour because this period was the critical peak hour in the December 2018 TIS. The results of the analysis are presented in Table 1. The capacity analysis worksheet is attached.

TABLE 1: PM PEAK HOUR LEVELS OF SERVICE (UPDATED SITE PLAN)

INTERSECTION	TURNING MOVEMENT	LEVEL OF SERVICE (Average Approach Delay in sec/veh)	
		PM Peak Hour Original Site Plan	PM Peak Hour Updated Site Plan
Franklin Pike and Tyne Boulevard	Overall Intersection	D (53.9)	D (54.8)

As shown in Table 1, the analysis indicates that the study intersection is expected to operate at the same level of service after the update to the master plan. Therefore, the December 2018 TIS is still applicable to the updated master plan for the proposed development.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	216	2	378	8	3	1	136	540	4	2	972	147
Future Volume (vph)	216	2	378	8	3	1	136	540	4	2	972	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5		5.5	5.5			6.0			6.0	
Lane Util. Factor		1.00		1.00	1.00			0.95			0.95	
Frt		0.91		1.00	0.96			1.00			0.98	
Flt Protected		0.98		0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1673		1770	1793			3501			3469	
Flt Permitted		0.98		0.95	1.00			0.51			0.95	
Satd. Flow (perm)		1673		1770	1793			1792			3310	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	235	2	411	9	3	1	148	587	4	2	1057	160
RTOR Reduction (vph)	0	53	0	0	1	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	595	0	9	3	0	0	739	0	0	1209	0
Turn Type	Split	NA		Split	NA		Prot	NA		Perm	NA	
Protected Phases	4	4		3	3		1	6			2	
Permitted Phases										2		
Actuated Green, G (s)		34.6		3.0	3.0			54.2			44.2	
Effective Green, g (s)		34.6		3.0	3.0			54.2			44.2	
Actuated g/C Ratio		0.32		0.03	0.03			0.50			0.41	
Clearance Time (s)		5.5		5.5	5.5			6.0			6.0	
Vehicle Extension (s)		4.0		4.0	4.0			2.0			2.0	
Lane Grp Cap (vph)		532		48	49			955			1344	
v/s Ratio Prot		c0.36		c0.01	0.00			c0.03				
v/s Ratio Perm								0.36			c0.37	
v/c Ratio		1.12		0.19	0.06			0.77			0.90	
Uniform Delay, d1		37.1		51.7	51.5			22.3			30.2	
Progression Factor		1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2		75.6		2.6	0.7			6.1			9.8	
Delay (s)		112.7		54.3	52.3			28.4			40.1	
Level of Service		F		D	D			C			D	
Approach Delay (s)		112.7			53.7			28.4			40.1	
Approach LOS		F			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	54.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	108.8	Sum of lost time (s)	23.0
Intersection Capacity Utilization	107.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

DECEMBER 2018

TRAFFIC AND PARKING STUDY

FIRST PRESBYTERIAN CHURCH AND OAK HILL SCHOOL OAK HILL, TENNESSEE

PREPARED FOR:
ORCUTT | WINSLOW

KCI TECHNOLOGIES

1101 17TH AVENUE SOUTH
NASHVILLE, TENNESSEE 37212

TRAFFIC & PARKING STUDY
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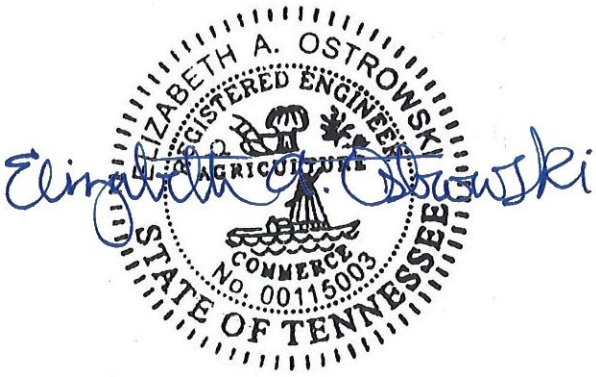

12.28.2018

PREPARED BY:

KCI TECHNOLOGIES, INC

1101 17th Avenue South
Nashville, TN 37212
615.370.8410 office 615.370.8455 fax
www.kci.com

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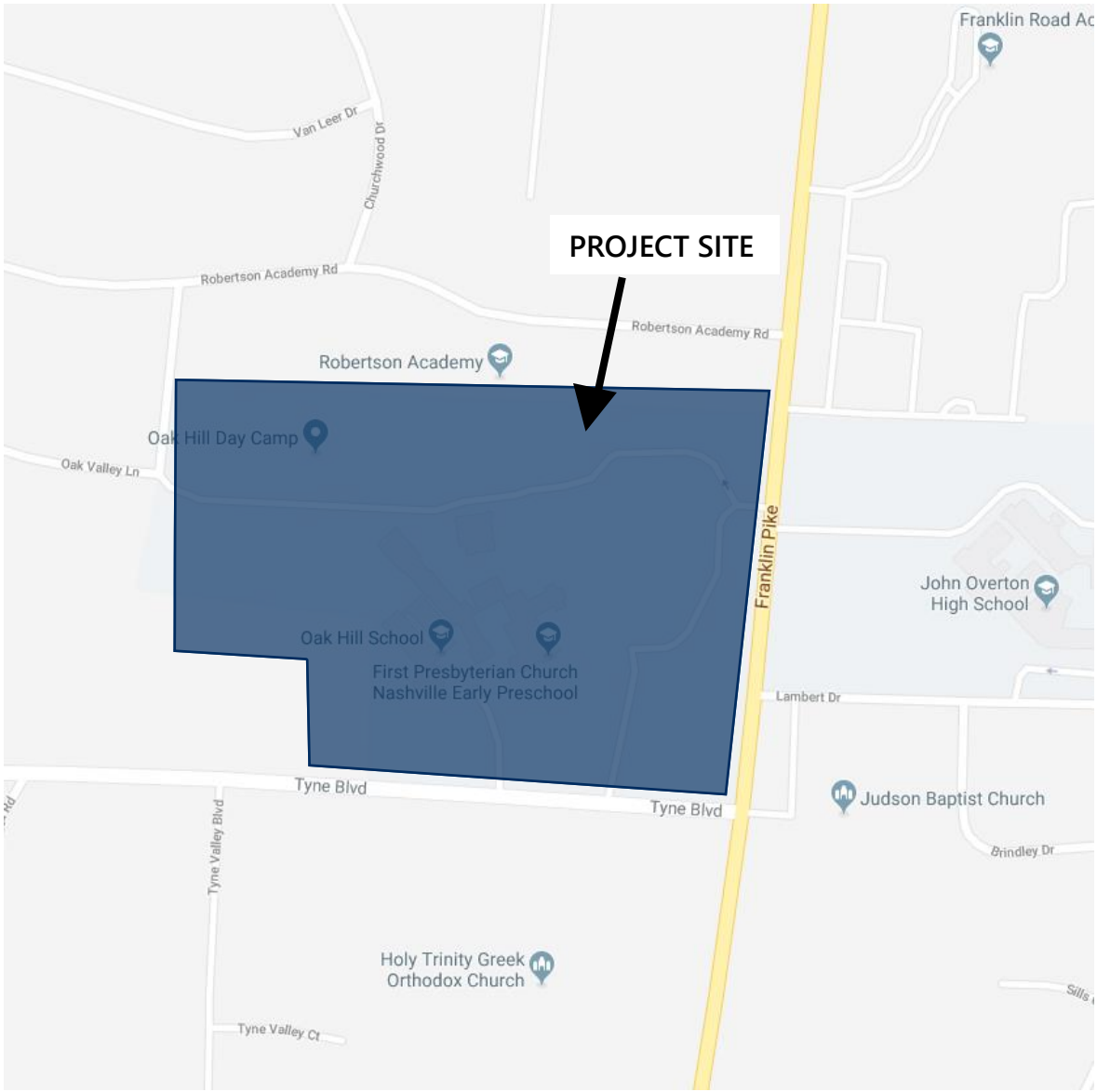
1. INTRODUCTION AND PROJECT DESCRIPTION

The purpose of this study is to analyze the traffic impacts and access plan associated with the proposed updated master plan for the First Presbyterian Church and Oak Hill School located on the west side of Franklin Road in Oak Hill, Tennessee. According to the project's development team, following the implementation of the master plan, the current layout of the project site will be modified. The proposed master plan includes relocation of the existing horse arena and barns, reorientation and improvements to the existing school soccer field on the north of the project site, modifications to the existing access locations and internal roadway structure, and reconstruction/expansion of some of the existing parking facilities.

First Presbyterian Church has a current membership of approximately 3,700 members. The worship center currently has 855 seats. At the time of this study, the church provided two worship services, 8:30 and 11:00 on Sunday mornings. Oak Hill School currently has approximately 400 students in kindergarten through 6th grade with approximately 98 staff members. The property is bounded on the east by Franklin Road, on the south by Tyne Boulevard, on the west by single-family residences and Churchwood Drive, and on the north by single-family residences and Robertson Academy. Access to First Presbyterian Church and Oak Hill School is currently provided by one driveway on Franklin Road, two driveways on Tyne Boulevard, and one driveway on Churchwood Drive. According to the master plan, all of the existing accesses are planned to remain at their current locations. Furthermore, a separate driveway on Tyne Boulevard provides an access to the existing counseling building. Based on the current master plan, the existing driveway to this building is proposed to be removed. Access to the building is planned to be shared with the westernmost driveway on Tyne Boulevard.

The current master plan for the First Presbyterian Church and Oak Hill property is shown in Appendix A.

In this study, the current operating characteristics of the adjacent roadways and intersections in the vicinity of the project site are evaluated. Any expected modifications to the current layout of the study intersections are taken into considerations and their traffic impacts are evaluated. Finally, recommendations are presented, including roadway improvements and/or traffic control improvements that are needed to accommodate the expected changes.



Location of the Project Site
(Not to Scale)

Figure 1.

2. EXISTING CONDITIONS

2.1 Existing Traffic Volumes

In order to provide data for the traffic impact analysis, manual traffic counts were conducted at the following intersections:

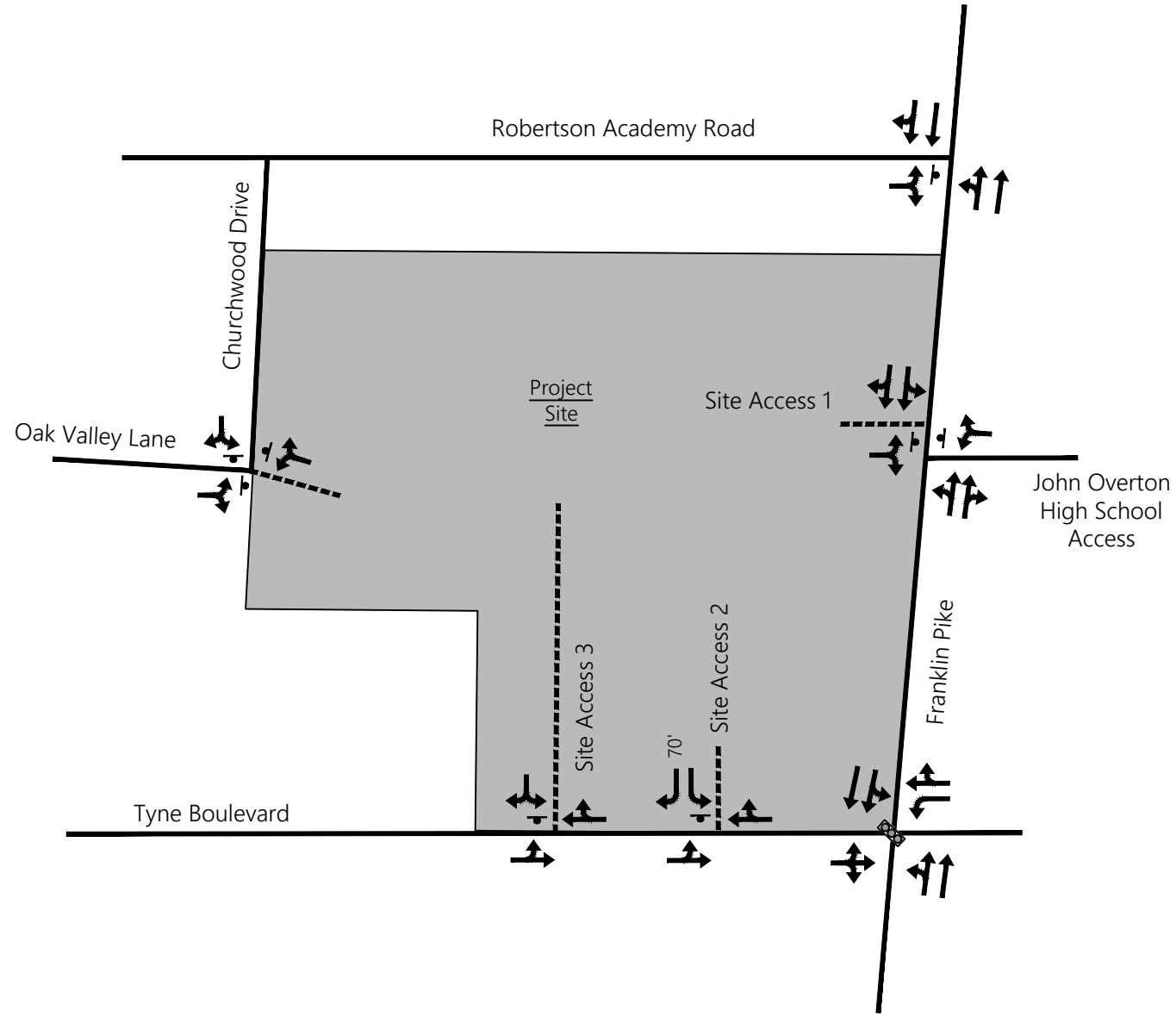
- Oak Valley Lane and Churchwood Drive (unsignalized)
- Franklin Pike and Robertson Academy Road (unsignalized)
- Franklin Pike and Site Access 1 (unsignalized)
- Franklin Pike and John Overton High School Access (unsignalized)
- Franklin Pike and Tyne Boulevard/Judson Baptist Church Driveway (signalized)
- Tyne Boulevard and Site Access 2(unsignalized)
- Tyne Boulevard and Site Access 3 (unsignalized)
- Internal Oak Hill School Roundabout (unsignalized)

Initial traffic counts for the study intersections were conducted in May 2018 by KCI Technologies, Inc. (KCI). Specifically, the turning movement counts were conducted from 7:00 – 9:00 AM and 2:00 – 6:00 PM on a typical weekday in May 2018 while local schools were in session. From the counts, it was determined that the peak hours of traffic flow for the study intersections occurred from 7:45 – 8:45 AM and 4:45 – 5:45 PM. Weekend traffic counts were conducted in December 2018 by KCI Technologies, Inc. Specifically, the turning movement counts were collected from 8:00 AM – 12:00 PM on a typical Sunday in early December 2018 at all study intersections except two. The intersection of Franklin Pike and Robertson Academy Road and the Internal Oak Hill School Roundabout were both deemed less relevant to Sunday traffic counts that aimed at capturing mostly trips to and from church services. Thus, weekend traffic counts were not conducted at these two intersections. From the counts, it was determined that the Sunday peak hour of traffic flow for the study intersections occurred from 9:45 – 10:45 AM. The existing laneage is presented in Figure 2 and the existing peak hour turning movement volumes are presented in Figure 3. A detailed summary of the turning movement counts is included in Appendix B.

In addition to the above information, average daily traffic volumes were obtained from the Tennessee Department of Transportation (TDOT). There are two TDOT count stations located in the vicinity of the project site. The count station locations and annual average daily traffic (AADT) in 2016 is shown in Table 1.

TABLE 1: TDOT COUNT STATION DATA

LOCATION	2016 AADT (vpd)
Franklin Pike *(south of Robertson Academy Road)*	17,171
Tyne Boulevard *(between Overton Lea Road and Lealand Lane)*	6,559

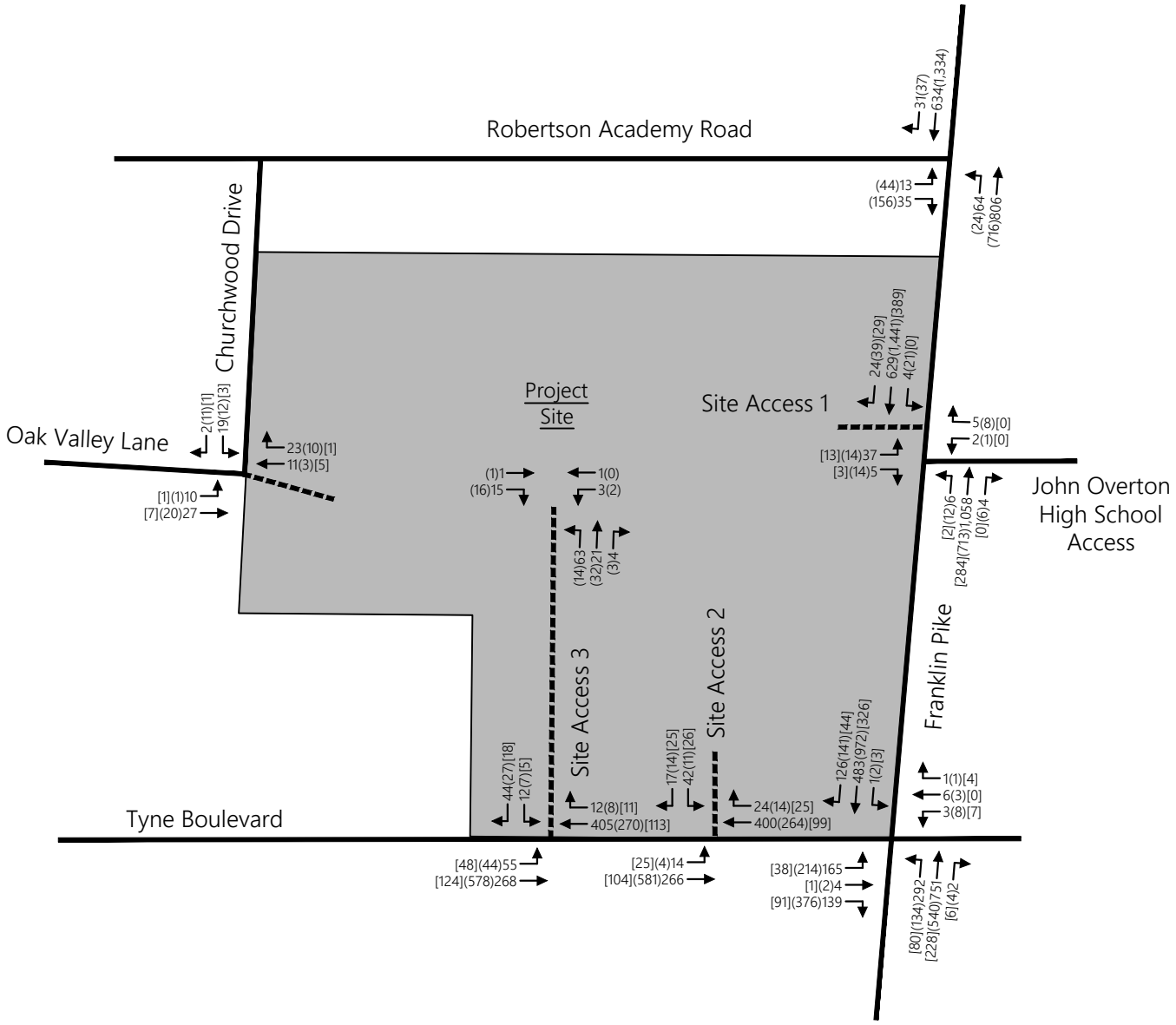


- Stop Sign
- Traffic Signal
XX' - Storage Length
TWLTL - Two-Way Left Turn Lane

N

Existing Laneage
(Not to Scale)

Figure 2.



XXX - AM Peak Hour
(XXX) - PM Peak Hour
[XXX] - Sunday Peak Hour

N

Existing Peak Hour Traffic Volumes
(Not to Scale)

Figure 3.

2.2 Existing Traffic Operations

To determine the current operation of the study intersections, capacity analyses were performed for the weekday AM and PM peak hours and for the Sunday AM peak hour. The capacity calculations were performed according to the methods outlined in the *Highway Capacity Manual*, TRB 2010. The capacity analyses result in the determination of a Level of Service (LOS) for an intersection. The LOS is a concept used to describe how well an intersection or roadway operates. LOS A is the best, while LOS F is the worst. LOS D is typically considered as the minimum acceptable LOS for a signalized intersection in an urbanized area. Table 2 presents the descriptions of LOS for unsignalized intersections. Table 3 presents the descriptions of LOS for signalized intersections.

TABLE 2: DESCRIPTIONS OF LEVEL OF SERVICE FOR UNSIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	DESCRIPTION	CONTROL DELAY (sec/veh)
A	Little or no delay	≤ 10.0
B	Short traffic delay	>10 and ≤ 15
C	Average traffic delay	>15 and ≤ 25
D	Long traffic delay	>25 and ≤ 35
E	Very long traffic delay	>35 and ≤ 50
F	Extreme traffic delay	> 50.0

Source: *Highway Capacity Manual*, TRB 2010

TABLE 3: DESCRIPTIONS OF LEVEL OF SERVICE FOR SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	DESCRIPTION	CONTROL DELAY (sec/veh)
A	Operations with very low delay. This occurs when progression is extremely favorable. Most vehicles do not stop at all.	≤ 10
B	Operations with stable flows. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	>10 and ≤ 20
C	Operations with stable flow. Occurs with fair progression and/or longer cycle lengths. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	>20 and ≤ 35
D	Approaching unstable flow. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop.	>35 and ≤ 55
E	Unstable flow. This is considered to be the limit for acceptable delay. These high delays generally indicate poor progression, long cycle lengths, and high V/C ratios.	>55 and ≤ 80
F	Unacceptable delay. This condition often occurs with over saturation or with high V/C ratios. Poor progression and long cycle lengths may also cause such delay levels.	>80.0

Source: *Highway Capacity Manual*, TRB 2010

The signal timing and phasing plan for the signalized intersection of Franklin Pike and Tyne Boulevard was obtained from Metro Public Works and utilized for the capacity analyses. The signal timing data is included in Appendix C.

The results of the capacity analyses for the existing conditions at the study intersections are presented in Table 4. As shown, all intersections and critical movements operate at LOS D or better in both the AM and PM peak hours with two exceptions. The eastbound approach of Robertson Academy Road at the intersection with Franklin Pike operates at LOS F in the weekday PM peak hour. The eastbound approach of Site Access 1 at the intersection with Franklin Pike operates at LOS F in the weekday PM peak hour. These performances are common for unsignalized approaches to high-volume arterial streets such as Franklin Pike.

Capacity analyses worksheets are included in Appendix D.

TABLE 4: EXISTING PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	LEVEL OF SERVICE (Average Approach Delay in sec/veh)		
		Weekday Existing AM	Weekday Existing PM	Sunday Existing AM
Franklin Pike and Tyne Boulevard	Overall Intersection	C (28.2)	D (53.9)	B (12.6)
Oak Valley Lane and Churchwood Drive	Eastbound Approach	A (7.3)	A (7.1)	A (7.0)
	Westbound Approach	A (6.8)	A (6.6)	A (6.9)
	Southbound Approach	A (7.3)	A (6.9)	A (7.0)
Franklin Pike and Robertson Academy Road	Northbound Left-Turn	A (9.5)	B (13.6)	--
	Eastbound Approach	C (18.7)	F (250.6)	--
Franklin Pike and Site Access 1	Northbound Left-Turn	A (9.1)	B (14.5)	A (0)
	Eastbound Approach	D (34.5)	F (72.8)	B (12.9)
Franklin Pike and John Overton High School Access Driveway	Westbound Approach	C (20.4)	C (16.2)	A (0)
	Southbound Left-Turn	B (11.1)	A (9.5)	A (0)
Tyne Boulevard and Site Access 2	Eastbound Left-Turn	A (8.3)	A (7.9)	A (7.5)
	Southbound Left-Turn	C (16.3)	C (17.8)	B (10.5)
	Southbound Right-Turn	B (11.1)	A (9.9)	A (9.0)
Tyne Boulevard and Site Access 3	Eastbound Left-Turn	A (8.4)	A (8.0)	A (7.6)
	Southbound Approach	B (13.1)	B (12.4)	A (9.5)
Internal Roundabout	Overall Intersection	A (3.9)	A (3.6)	--

Note: For two-way stop-controlled intersections, a LOS is presented for each critical turning movement. For signalized intersections, a LOS is presented for the overall intersection.

3. MASTER PLAN IMPACTS

3.1 Site Layout Changes

Analyses of the new master plan for First Presbyterian Church and Oak Hill School were conducted to ensure efficient traffic operations will continue after its implementation on and off-site. According to the proposed master plan, the following changes will be made to the current site layout:

- The horse arena and barn will be relocated from the northwestern corner of the site to its southwestern corner, which currently accommodates a single-family detached home.
- A new soccer field outlined by a track will be built in the northwestern corner of the property, which currently accommodates three small soccer fields and the horse arena and barn.
- The practice field space on the west side of the property will be expanded.
- The parking lot directly east of the practice field space will be re-oriented to improve the access and circulation between the driveways and this parking lot.
- A few renovations are planned for the existing school buildings, including new art classrooms, a new gym and dining hall, a new Pre-K wing, and a new "C" wing. These renovations are not expected to generate any new vehicular trips.

3.2 Capacity Analysis Based on the Current Master Plan

As previously mentioned, despite the proposed modifications to the existing project site, no new vehicular trips are expected to be generated since student enrollment and the number of seats in the church sanctuary are not expected to be increased. Furthermore, the primary access driveways are planned to remain at their current locations. Consequently, the proposed master plan is not expected to have any impacts on the operational performances of the study intersections. Therefore, capacity analyses under the existing conditions as shown in Table 4 are expected to represent the operational performances of the study intersections after the implementation of the proposed changes in the master plan. However, for the purpose of this study, potential roadway improvements within the study area were investigated and the impacts of those improvements were evaluated.

To accompany the new master plan for the property being studied, potential roadway improvements were considered as follows:

- Consider the feasibility of realigning Site Access 1 so that it intersects Franklin Road directly across from the existing service access driveway to John Overton High School. This alignment could be done by either shifting Site Access 1 south or by shifting John Overton's driveway north. Alignment of these two approaches could potentially reduce turning movement conflicts; however, the implementation of these improvements is limited by the presence of an existing historic stone wall on the eastbound approach of Site Access 1 and a large utility pole located on the west side of Franklin Road. Also, it should be noted that since the John Overton High School driveway is primarily a service driveway, traffic volumes entering and exiting this driveway are low.
- Provide a right-turn lane with approximately 125 feet of storage on the eastbound approach of Tyne Boulevard at the intersection of Franklin Pike and Tyne Boulevard and optimize the signal timing accordingly. Previously, concept plans for this right-turn-lane were prepared by the City of Oak Hill.

To determine the operation of the study area intersections under the recommended conditions following the application of the master plan, capacity analyses were performed for the weekday AM and PM peak hours. Capacity analyses were not performed with Sunday traffic counts because the levels of service at which the study intersections currently operate during the Sunday AM peak hour do not present any concerns and no significant LOS changes are expected to occur following the recommended roadway improvements.

Analyses were conducted to evaluate the benefits of adding an eastbound right-turn lane at the intersection of Franklin Road and Tyne Boulevard. As shown in Tables 5A and 5B, with the addition of a right-turn lane on Tyne Boulevard at Franklin Pike, the overall intersection of Franklin Pike and Tyne Boulevard is expected to continue operating at LOS C in the AM peak hour and to improve from LOS D to LOS C in the PM peak hour. Additionally, if Site Access 1 and the John Overton High School Access on Franklin Road were aligned, all approaches would continue to operate at the same levels of service as they do under current conditions, with one exception. The eastbound approach of Site Access 1 at Franklin Pike is expected to deteriorate from LOS D to LOS E in the AM peak hour. This deterioration in level of service is due to the increase in the number of vehicles conflicting with the eastbound traffic; westbound vehicles exiting John Overton High School and turning right will present an added conflict for eastbound left-turning vehicles and westbound vehicles turning left will present an added conflict for eastbound right-turning vehicles.

Capacity analyses worksheets are included in Appendix D.

TABLE 5A: PROJECTED AM PEAK HOUR LEVELS OF SERVICE WITH INTERSECTION MODIFICATIONS

INTERSECTION	TURNING MOVEMENT	LEVEL OF SERVICE (Average Approach Delay in sec/veh)	
		Weekday Existing AM	Weekday Projected AM
Franklin Pike and Tyne Boulevard (with additional eastbound right-turn lane)	Overall Intersection	C (28.2)	C (25.4)
Franklin Pike and Site Access 1 and John Overton High School Access Driveway (aligned*)	Northbound Left-Turn	A (9.1)	A (9.1)*
	Eastbound Approach	D (34.5)	E (47.5)*
	Westbound Approach	C (20.4)	C (24.4)*
	Southbound Left-Turn	B (11.1)	B (11.0)*
**Post-master plan, Site Access 1 and the John Overton High School Access Driveway become aligned across Franklin Pike.*			

TABLE 5B: PROJECTED PM PEAK HOUR LEVELS OF SERVICE WITH INTERSECTION MODIFICATIONS

INTERSECTION	TURNING MOVEMENT	LEVEL OF SERVICE (Average Approach Delay in sec/veh)	
		Weekday Existing PM	Weekday Projected PM
Franklin Pike and Tyne Boulevard (with additional eastbound right-turn lane)	Overall Intersection	D (53.9)	C (27.3)
Franklin Pike and Site Access 1 and John Overton High School Access Driveway (aligned*)	Northbound Left-Turn	B (14.5)	B (14.3)*
	Eastbound Approach	F (72.8)	F (177.7)*
	Westbound Approach	C (16.2)	C (19.1)*
	Southbound Left-Turn	A (9.5)	A (9.4)*
**Post-master plan, Site Access 1 and the John Overton High School Access Driveway become aligned across Franklin Pike.*			

3.3 Analysis of Churchwood Access

The access to the project site via Churchwood Avenue is currently controlled by a gate that is closed during certain times of the day for safety reasons and in order to discourage vehicles from crossing The Oak Hill School campus as cut-thru traffic. KCI recommends that the gate continue to operate as it currently does and that if any modifications are made to the its time of operation, neighbors should be promptly notified.

4. QUEUE ANALYSIS

4.1 Existing Queue Analysis

In addition to the capacity analyses at the study intersections, the 95th percentile queue lengths during the weekday AM and PM peak hours were evaluated for all study intersections under the existing conditions. Table 6 shows the queues for the critical movements at these intersections. Queue analysis worksheets for all study intersections are included in Appendix D.

TABLE 6: EXISTING QUEUE LENGTHS

INTERSECTION	TURNING MOVEMENT	95th-PERCENTILE QUEUE LENGTH (feet)	
		Weekday Existing AM	Weekday Existing PM
Franklin Pike and Tyne Boulevard	Eastbound Approach	286′	743′*
	Westbound Left-Turn	12′	23′
	Westbound Shared Through/Right-Turn	21′	13′
	Northbound Approach	946′*	665′*
	Southbound Approach	239′	588′*
Oak Valley Lane and Churchwood Drive	Eastbound Approach	3′	3′
	Westbound Approach	3′	0′
	Southbound Approach	3′	3′
Franklin Pike and Robertson Academy Road	Northbound Left-Turn	8′	5′
	Eastbound Approach	15′	333′

Table 6 continues on the following page

INTERSECTION	TURNING MOVEMENT	95th-PERCENTILE QUEUE LENGTH (feet)	
		Weekday Existing AM	Weekday Existing PM
Franklin Pike and Site Access 1	Northbound Left-Turn	0′	3′
	Eastbound Approach	28′	35′
Franklin Pike and John Overton High School Access Driveway	Westbound Approach	3′	3′
	Southbound Left-Turn	0′	3′
Tyne Boulevard and Site Access 2	Eastbound Left-Turn	0′	0′
	Southbound Left-Turn	10′	3′
	Southbound Right-Turn	3′	3′
Tyne Boulevard and Site Access 3	Eastbound Left-Turn	5′	3′
	Southbound Approach	10′	5′
**95th percentile volume exceeds capacity, queue may be longer*			

4.2 Projected Queue Analysis

In order to evaluate the impact that the proposed new laneage will have on the queues around the project site, the 95th percentile queue lengths were observed during the weekday AM and PM peak hours under proposed conditions following the implementation of the master plan and recommended roadway improvements. Tables 7A and 7B show the queues for the critical movements at all study intersections that were modified as specified in *Section 3.2* of this report. Queue analysis worksheets for all study intersections are included in Appendix D.

TABLE 7A: PROJECTED AM QUEUE LENGHTS

INTERSECTION	TURNING MOVEMENT	95th-PERCENTILE QUEUE LENGTH (feet)	
		Weekday Existing AM	Weekday Projected AM
Franklin Pike and Tyne Boulevard	Eastbound Approach	286′	EBT 302′* EBR 63′
	Westbound Left-Turn	12′	12′
	Westbound Shared Through/Right-Turn	21′	21′
	Northbound Approach	946′*	774′*
	Southbound Approach	239′	171′
Franklin Pike and Site Access 1 and John Overton High School Access Driveway (aligned in projected scenario)	Northbound Left-Turn	0′	0′
	Eastbound Approach	28′	35′
	Westbound Approach	3′	3′
	Southbound Left-Turn	0′	0′

**95th percentile volume exceeds capacity, queue may be longer*

TABLE 7B: PROJECTED PM QUEUE LENGHTS

INTERSECTION	TURNING MOVEMENT	95th-PERCENTILE QUEUE LENGTH (feet)	
		Weekday Existing PM	Weekday Projected PM
Franklin Pike and Tyne Boulevard	Eastbound Approach	743′*	EBT 248′ EBR 207′
	Westbound Left-Turn	23′	24′
	Westbound Shared Through/Right-Turn	13′	14′
	Northbound Approach	665′*	597′*
	Southbound Approach	588′*	490′
Franklin Pike and Site Access 1 and John Overton High School Access Driveway (aligned in projected scenario)	Northbound Left-Turn	3′	3′
	Eastbound Approach	35′	63′
	Westbound Approach	3′	3′
	Southbound Left-Turn	3′	3′

**95th percentile volume exceeds capacity, queue may be longer*

5. PARKING ANALYSIS

According to the provided site plan, the development is planned to be accommodated by approximately 656 surface parking spaces. The Zoning Ordinance for The City of Oak Hill was reviewed to determine the minimum required parking spaces that should be provided by the development. Since Oak Hill School occupies the parking spaces mostly on weekdays and First Presbyterian Church occupies parking spaces mostly on Sunday mornings, their parking demands do not overlap. Thus, the total number of parking spaces to be provided should be in accordance with whichever land use has the greatest parking demand. According to Oak Hill School's website and information provided by the project's development team, Oak Hill School has 495 students and 98 employees, 65 of whom are teachers, and the main sanctuary at First Presbyterian Church includes 855 seats. The results of the parking calculations are shown in Table 8. As shown, the proposed development requires a minimum of 285 parking spaces. Thus, the development is accommodated by more than an adequate number of parking spaces.

TABLE 8: REQUIRED PARKING BASED ON THE CITY OF OAK HILL'S ZONING ORDINANCE

LAND USE	SIZE	PARKING RATE PER CODE OF ORDINANCES	PARKING DEMAND
Churches	855 seats	1 space for each 3 seats in the main assembly hall	285
Schools – Grades 1-7	495 students 65 teachers 33 employees	1 space for each 4 students, teachers, and employees, or 1 space for each 5 seats in an auditorium, whichever is greater	148
Total (maximum of the two land uses)			**285 Spaces**

6. CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study is to analyze the impacts associated with the implementation of an updated master plan for the First Presbyterian Church and Oak Hill School property located on the west side of Franklin Pike in Oak Hill, Tennessee. The proposed master plan is expected to bring a few layout changes to the project's site, as mentioned in detail previously. The analyses presented in this study indicate that the impacts of the proposed master plan on the existing street network will be negligible since student enrollment and the number of seats in the church sanctuary are not expected to be increased. These specific recommendations will provide safe and efficient traffic operations within the study area following the completion of the proposed project. The recommendations are as follows:

Franklin Pike and Tyne Boulevard:

- A right-turn lane with approximately 125 feet of storage is recommended for the eastbound approach of Tyne Boulevard at the intersection of Franklin Pike and Tyne Boulevard and the signal timing should be optimized accordingly. The City of Oak Hill has already agreed to dedicate its right-of-way for this purpose.

Franklin Pike and Site Access 1/John Overton High School Access:

- The feasibility of realigning Site Access 1 so that it intersects Franklin Road directly across from the existing service access driveway to John Overton High School should be considered. This alignment could be done by either shifting Site Access 1 south or by shifting John Overton's driveway north. Although this realignment could potentially decrease turning movement conflicts, its implementation is limited by the presence of an existing historic stone wall on the eastbound approach of Site Access 1 and a large utility pole located on the west side of Franklin Road. Therefore, this recommendation should be further discussed so that the benefits of the proposed realignment can be properly weighed against the challenges imposed by nearby physical barriers.

In summary, based on the analyses conducted, no further recommendations are presented for the proposed project.

APPENDICES

APPENDIX A
PRELIMINARY SITE PLAN
APPENDIX B
DETAILED TURNING MOVEMENT COUNTS
APPENDIX C
SIGNAL TIMINGS
APPENDIX D
CAPACITY ANALYSES

APPENDIX A
PRELIMINARY SITE PLAN

CHURCHWOOD DRIVE

SOCCER FIELD AND TRACK

RE-ORIENTED PARKING

EXPANDED PRACTICE FIELD SPACE

PLAYGROUND

NEW GYM / DINING HALL
1st FLOOR FFE 652.8
2nd FLOOR FFE 669.3

1st FLOOR FFE 655.3
2nd FLOOR FFE 669.3

NEW NORTH ENTRANCE

FFE 652.8

1st FLOOR FFE 652.8'
2nd FLOOR FFE 669.2'

NEW 'C' WING

1st FLOOR FFE 655.7
2nd FLOOR FFE 669.2

FFE 670.8

FFE 652.8
NEW ART CLASSROOMS

OUTDOOR GATHERING / FLAG RAISING

PRE-K PLAYGROUND

NEW PRE-K WING

FFE 652.8

FFE 652.8

FFE 665.18

1st FLOOR FFE 657.3
2nd FLOOR FFE 670.8

FFE 652.8

HORSE ARENA

HORSE BARN

FRANKLIN PIKE

LAMBERT DRIVE

TYNE BOULEVARD

GRID

LEGEND

- WATER VALVE
- WATER METER
- FIRE HYDRANT
- GAS METER
- GAS VALVE
- IRON ROD NEW — IRNO
- IRON ROD OLD — IRSO
- CLEAN-OUT — CO
- GUARD POST — GP
- SIGN POST
- CATCH BASIN
- BENCHMARK
- MANHOLE
- UTILITY POLE
- LIGHT POLE
- TREE
- PROPERTY LINE
- EDGE OF PAVEMENT
- EDGE OF CONC.
- WALL
- CURB
- OVERHEAD — OH
- WATER LINE — W
- SEWER LINE — SA
- GAS LINE — G
- STORM SEWER/CULVERT — ST
- CONTOUR LINE — 660
- FENCE LINE — X

First Presbyterian Church +
Oak Hill School

A Long Range Plan

25 September 2018

orcutt|winslow

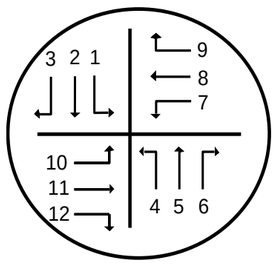
BOUNDARY AND TOPOGRAPHIC SURVEY OF
FIRST PRESBYTERIAN CHURCH
PARCEL 10
MAP 146-2
CITY OF OAK HILL
NASHVILLE, DAVIDSON COUNTY, TENNESSEE
SCALE: 1" = 50' - DATE: DECEMBER 02, 2005
REVISED: DETENTION POND & LIGHT POLES
DATED: DECEMBER 11, 2006

SHEET 3 OF 3

50 0 25 50 100

GRAPHIC SCALE - 1" = 50'

APPENDIX B
DETAILED TURNING MOVEMENT COUNTS

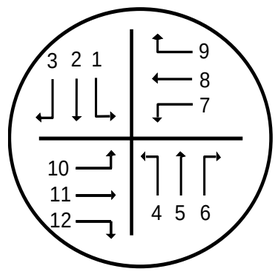


North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Robertson Academy Rd & Franklin Pk
DATE: 5/2/2018
RECORDER: zhiwar rashid
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	Franklin			Franklin			Road C			Robertson acad rd			
TIME	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	
6:00-6:15 AM													
6:15-6:30													**399**
6:30-6:45													**831**
6:45-7:00													**1,209**
7:00-7:15		121	3	11	258					2		4	**1,612**
7:15-7:30		116	8	40	263					1		4	**1,587**
7:30-7:45		126	5	33	208					1		5	**1,589**
7:45-8:00		154	5	21	216					1		6	**1,583**
8:00-8:15		142	6	16	198					3		9	**1,522**
8:15-8:30		189	9	17	201					6		12	**1,148**
8:30-8:45		149	11	10	191					3		8	**714**
8:45-9:00		136	4	7	183					2		10	**342**
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00													
10:00-10:15													
10:15-10:30													
10:30-10:45													
10:45-11:00													
11:00-11:15													
11:15-11:30													
11:30-11:45													
11:45-12:00 PM													
12:00-12:15													
12:15-12:30													
12:30-12:45													
12:45-1:00													
1:00-1:15													
1:15-1:30													**389**
1:30-1:45													**734**
1:45-2:00													**1,083**
2:00-2:15		139	4	5	226					8		7	**1,513**
2:15-2:30		149	6	8	173					5		4	**1,567**
2:30-2:45		134	22	4	173					7		9	**1,626**
2:45-3:00		188	23	13	178					7		21	**1,680**
3:00-3:15		220	14	14	159					11		25	**1,678**
3:15-3:30		226	4	2	135					18		19	**1,700**
3:30-3:45		197	2	5	165					15		19	**1,826**
3:45-4:00		229	5	5	157					6		26	**1,967**
4:00-4:15		272	4	3	154					19		13	**2,148**
4:15-4:30		299	4	5	183					12		27	**2,251**
4:30-4:45		319	11	6	165					14		29	**2,255**
4:45-5:00		329	6	5	203					17		49	**2,311**
5:00-5:15		341	11	12	161					10		33	**2,216**
5:15-5:30		327	11	7	143					8		38	**1,648**
5:30-5:45		337	9		209					9		36	**1,114**
5:45-6:00		285	5	5	178					4		37	**514**
6:00-6:15													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
7:15-7:30													
7:30-7:45													
7:45-8:00													
8:00-8:15													
8:15-8:30													
8:30-8:45													
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL		5,124	192	254	4,480					189		450	
AM PK HR		634	31	64	806					13		35	7:45 AM - 8:45 AM
MID PK HR		422	32	17	572					20		20	
PM PK HR		1,334	37	24	716					44		156	4:45 PM - 5:45 PM

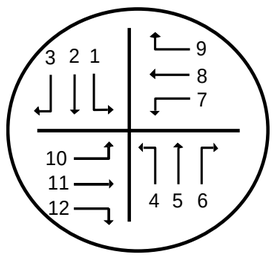


North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Main front access & franklin
DATE: 5/2/2018
RECORDER: zhiwar rashid
NOTES: A lot of cars going in and out of franklin academy's parking lot a few feet up the road.

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	**FRANKLIN**			**FRANKLIN**			**OVERTON ENTRANCE**			**OAK HILL MAIN ENTRANCE**			
TIME	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	
6:00-6:15 AM													
6:15-6:30													**436**
6:30-6:45													**876**
6:45-7:00													**1,269**
7:00-7:15	6	109	11		301	2	1		1	5			**1,697**
7:15-7:30	2	97	17	4	312				2	5		1	**1,673**
7:30-7:45	2	119	10	8	240	1				11		2	**1,764**
7:45-8:00	1	142	14	5	240		1		1	22		2	**1,774**
8:00-8:15		143	4		254	1	1			8		1	**1,699**
8:15-8:30	1	191	3	1	323	3			2	6		1	**1,287**
8:30-8:45	2	153	3		241				2	1		1	**756**
8:45-9:00	1	148	5	1	194	2			1	1			**353**
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00													
10:00-10:15													
10:15-10:30													
10:30-10:45													
10:45-11:00													
11:00-11:15													
11:15-11:30													
11:30-11:45													
11:45-12:00 PM													
12:00-12:15													
12:15-12:30													
12:30-12:45													
12:45-1:00													
1:00-1:15													
1:15-1:30													**384**
1:30-1:45													**725**
1:45-2:00													**1,066**
2:00-2:15	2	144	3		220	1	4		8	2			**1,467**
2:15-2:30		148	3		173	1	1		12	2		1	**1,528**
2:30-2:45		140	9	2	178		1		4	6		1	**1,584**
2:45-3:00		184	7	3	197		1		2	5		2	**1,648**
3:00-3:15		271	7	1	148				2	8		8	**1,665**
3:15-3:30	5	263	1		125				2			1	**1,694**
3:30-3:45	1	237	3		158	1	1			4			**1,796**
3:45-4:00	3	244	5		155		1		7	1		2	**1,932**
4:00-4:15		305	6		153	2	2		2	2		2	**2,118**
4:15-4:30	5	302	5	2	175	1	2		2	2		3	**2,200**
4:30-4:45	4	354	2		163	3	3		1	4		7	**2,251**
4:45-5:00	6	377	3	1	209	2			2	3		1	**2,269**
5:00-5:15	4	362	8		172	2			1	3		4	**2,207**
5:15-5:30	7	362	21	8	140	1			2	4		5	**1,651**
5:30-5:45	4	340	7	3	192	1	1		3	4		4	**1,101**
5:45-6:00	2	344	4	1	180	1	1		1	5		3	**542**
6:00-6:15													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
7:15-7:30													
7:30-7:45													
7:45-8:00													
8:00-8:15													
8:15-8:30													
8:30-8:45													
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	58	5,479	161	40	4,843	25	21		60	114		52	
AM PK HR	4	629	24	6	1,058	4	2		5	37		5	7:45 AM - 8:45 AM
MID PK HR	2	432	15	2	571	2	6		24	10		2	
PM PK HR	21	1,441	39	12	713	6	1		8	14		14	4:45 PM - 5:45 PM

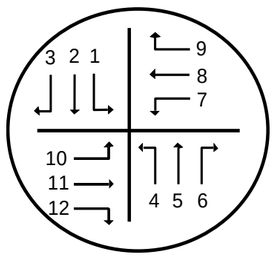


North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: TYNE & FRANKLIN
DATE: 5/2/2018
RECORDER: ZHIWAR RASHID
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	FRANKLIN			FRANKLIN			TYNE			TYNE			
TIME	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	
6:00-6:15 AM													
6:15-6:30													**485**
6:30-6:45													**1,012**
6:45-7:00													**1,441**
7:00-7:15		71	22	106	225	2	2	4	2	39		12	**1,904**
7:15-7:30	1	75	24	127	225		4	10	2	31	2	26	**1,890**
7:30-7:45		84	27	83	163			2		34		36	**1,946**
7:45-8:00		113	28	64	175		1	2		35	1	44	**1,971**
8:00-8:15		113	25	70	169			3	1	42	1	47	**1,877**
8:15-8:30		144	44	88	228		1			54	1	23	**1,406**
8:30-8:45	1	113	29	68	179	2	1	1		34	1	25	**823**
8:45-9:00	2	99	18	51	134	1		1		25	5	33	**369**
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00													
10:00-10:15													
10:15-10:30													
10:30-10:45													
10:45-11:00													
11:00-11:15													
11:15-11:30													
11:30-11:45													
11:45-12:00 PM													
12:00-12:15													
12:15-12:30													
12:30-12:45													
12:45-1:00													
1:00-1:15													
1:15-1:30													**372**
1:30-1:45													**747**
1:45-2:00													**1,130**
2:00-2:15	1	104	21	39	93	1	23	2	21	32		35	**1,561**
2:15-2:30		107	30	48	105	1	9	1	5	22	1	46	**1,723**
2:30-2:45		114	20	31	101		3	1	1	57	1	54	**1,807**
2:45-3:00		118	37	42	130	1	2	2		56		43	**1,865**
3:00-3:15		208	46	35	99		1			58		87	**1,888**
3:15-3:30		196	28	28	80	1	3	1		39		83	**1,847**
3:30-3:45	1	169	28	25	85		1	2		65		65	**1,934**
3:45-4:00		167	40	35	99	2			1	55	2	53	**2,061**
4:00-4:15		204	40	31	91		4			45		78	**2,198**
4:15-4:30		216	31	31	115		2	2		52		97	**2,297**
4:30-4:45	1	243	35	33	129		2		1	37		87	**2,319**
4:45-5:00	1	233	30	26	146		2			68		85	**2,383**
5:00-5:15		270	34	31	130	2	2			39	1	83	**2,353**
5:15-5:30	1	227	36	42	104	2	1	1		42	1	111	**1,761**
5:30-5:45		242	41	35	160		3	2	1	60		88	**1,193**
5:45-6:00		234	25	25	113	2	1	1		51	5	104	**561**
6:00-6:15													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
7:15-7:30													
7:30-7:45													
7:45-8:00													
8:00-8:15													
8:15-8:30													
8:30-8:45													
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	9	3,864	739	1,194	3,278	17	68	38	35	1,072	22	1,445	
AM PK HR	1	483	126	290	751	2	3	6	1	165	4	139	7:45 AM - 8:45 AM
MID PK HR	1	325	71	118	299	2	35	4	27	111	2	135	
PM PK HR	2	972	141	134	540	4	8	3	1	209	2	367	4:45 PM - 5:45 PM

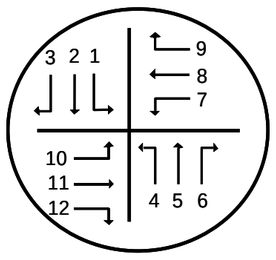


North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Tyne Blvd & East Access
DATE: 5/2/2018
RECORDER: Zhiwar Rashid
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	EAST ACCESS			NA			TYNE BLVD			TYNE BLVD			
TIME	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	
6:00-6:15 AM													
6:15-6:30													**188**
6:30-6:45													**418**
6:45-7:00													**638**
7:00-7:15	2		4					122	4	6	50		**813**
7:15-7:30	10		5					149	6	8	52		**815**
7:30-7:45	9		15					121	9	7	59		**805**
7:45-8:00	21		4					88	8	4	50		**760**
8:00-8:15	13		10					85	6	3	73		**734**
8:15-8:30	5		3					120	6	5	81		**544**
8:30-8:45	3							107	4	2	59		**324**
8:45-9:00	1		1					72	7	6	62		**149**
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00													
10:00-10:15													
10:15-10:30													
10:30-10:45													
10:45-11:00													
11:00-11:15													
11:15-11:30													
11:30-11:45													
11:45-12:00 PM													
12:00-12:15													
12:15-12:30													
12:30-12:45													
12:45-1:00													
1:00-1:15													
1:15-1:30													**135**
1:30-1:45													**299**
1:45-2:00													**492**
2:00-2:15	2		1					55	4	4	69		**694**
2:15-2:30	5		1					57	21	18	62		**806**
2:30-2:45	19		13					47	6	18	90		**843**
2:45-3:00	12		5					64	13	22	86		**822**
3:00-3:15	9		10					70	14	19	125		**819**
3:15-3:30	2							59	2	3	135		**765**
3:30-3:45	2		2					52	2	2	112		**780**
3:45-4:00	3		4					66	2	1	123		**814**
4:00-4:15	2							83	1	1	106		**821**
4:15-4:30	2		2					55		1	156		**834**
4:30-4:45	9		3					68	4	1	121		**841**
4:45-5:00	3		3					57	2	1	140		**874**
5:00-5:15	1		5					61	3	1	135		**881**
5:15-5:30	5		3					74	3	1	137		**675**
5:30-5:45	2		3					64	6	1	163		**452**
5:45-6:00	5		2					64		3	139		**213**
6:00-6:15													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
7:15-7:30													
7:30-7:45													
7:45-8:00													
8:00-8:15													
8:15-8:30													
8:30-8:45													
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	147		99					1,860	133	138	2,385		
AM PK HR	42		17					400	24	14	263		7:45 AM - 8:45 AM
MID PK HR	26		15					159	31	40	221		
PM PK HR	11		14					256	14	4	575		4:45 PM - 5:45 PM



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: TYNE BLVD & WEST ACCESS
DATE: 5/2/2018
RECORDER: ZHIWAR RASHID
NOTES: NO PEDS

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	**WEST ACCESS**			**NA**			**TYNE BLVD**			**TYNE BLVD**			
TIME	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	
6:00-6:15 AM													
6:15-6:30													**200**
6:30-6:45													**434**
6:45-7:00													**674**
7:00-7:15	1		1					124	4	9	61		**883**
7:15-7:30	2							145	16	17	54		**886**
7:30-7:45	4		19					106	11	39	61		**876**
7:45-8:00	4		22					82	7	41	53		**787**
8:00-8:15	3		13					99	1	9	78		**712**
8:15-8:30	4		7					128	1	4	80		**509**
8:30-8:45	1		2					91	3	1	53		**285**
8:45-9:00	1		2					63		5	63		**134**
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00													
10:00-10:15													
10:15-10:30													
10:30-10:45													
10:45-11:00													
11:00-11:15													
11:15-11:30													
11:30-11:45													
11:45-12:00 PM													
12:00-12:15													
12:15-12:30													
12:30-12:45													
12:45-1:00													
1:00-1:15													
1:15-1:30													**134**
1:30-1:45													**290**
1:45-2:00													**458**
2:00-2:15								53	3	2	76		**653**
2:15-2:30			3					58	6	7	82		**802**
2:30-2:45	4		8					55	1	1	99		**846**
2:45-3:00	1		4					67	2		121		**845**
3:00-3:15	25		57					78			123		**847**
3:15-3:30	3		8					55		2	132		**774**
3:30-3:45	4		1					52	2	3	105		**796**
3:45-4:00	3							75	2	7	110		**847**
4:00-4:15	2		9					68	3	2	126		**866**
4:15-4:30	1		11					63	1	6	140		**880**
4:30-4:45	8		14					69		9	118		**891**
4:45-5:00	4		6					55	2	6	143		**933**
5:00-5:15	2		9					67		10	136		**918**
5:15-5:30	1		4					72	5	13	138		**694**
5:30-5:45			8					75	1	15	161		**461**
5:45-6:00	1		3					52	1	5	139		**201**
6:00-6:15													
6:15-6:30													
6:30-6:45													
6:45-7:00													
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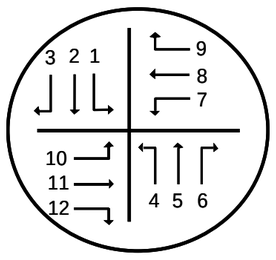
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	79		211					1,852	72	213	2,452		
AM PK HR	12		44					400	12	55	264		7:45 AM - 8:45 AM
MID PK HR	4		11					166	10	10	257		
PM PK HR	7		27					269	8	44	578		4:45 PM - 5:45 PM



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Roundabout & Church Pull Through
DATE: 5/2/18
RECORDER: SCU3FB/Zack Murphy
NOTES: Thrus go in the roundabout from that direction and leave the way they came/Northbound Left Turns rarely if at all enter the roundabout

	Southbound			Northbound			Westbound			Eastbound			
LOCATION													
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
5:00-5:15 AM													
5:15-5:30													
5:30-5:45													
5:45-6:00													
6:00-6:15													
6:15-6:30													**11**
6:30-6:45													**45**
6:45-7:00													**108**
7:00-7:15				7	2	1	1						**174**
7:15-7:30				27	4	2	1						**166**
7:30-7:45				29	15	1	1	1			1	15	**142**
7:45-8:00				24	19							23	**81**
8:00-8:15				1				1				1	**19**
8:15-8:30				2	3							5	**16**
8:30-8:45					2								**6**
8:45-9:00						1	1					2	**4**
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00													
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12:15-12:30													
12:30-12:45													
12:45-1:00													
1:00-1:15													
1:15-1:30													**1**
1:30-1:45													**8**
1:45-2:00													**22**
2:00-2:15				1									**27**
2:15-2:30				4	2							1	**77**
2:30-2:45				3	11								**82**
2:45-3:00				1								4	**74**
3:00-3:15				4	40							7	**79**
3:15-3:30					10	1	1						**47**
3:30-3:45				1	1			1				3	**53**
3:45-4:00				4	2	2	1					1	**68**
4:00-4:15				3	13	1	1				1		**68**
4:15-4:30				3	11							4	**72**
4:30-4:45				4	6							11	**69**
4:45-5:00				1	6	1						2	**63**
5:00-5:15				7	6	2	4					4	**62**
5:15-5:30				9	3							3	**39**
5:30-5:45				9	5							1	**24**
5:45-6:00				3	3							3	**9**
6:00-6:15													
6:15-6:30													
6:30-6:45													
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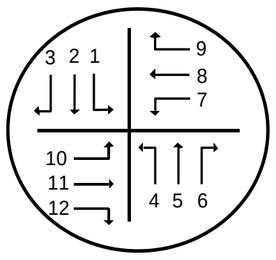
8:15-8:30													
8:30-8:45													
8:45-9:00													
TOTAL				147	164	12	11	3			2	90	
AM PK HR				63	21	4	3	1			1	15	7:45 AM - 8:45 AM
MID PK HR													
PM PK HR				14	32	3	2				1	16	4:45 PM - 5:45 PM



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Churchwood Drive & Oak Valley Lane
DATE: 5/2/18
RECORDER: SCU453/Zack Murphy
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	Churchwood Drive			Churchwood Drive			Oak Valley Lane			Oak Valley Lane			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
6:15-6:30													**18**
6:30-6:45													**71**
6:45-7:00													**132**
7:00-7:15	3		1					1	5	1	7		**211**
7:15-7:30	18		2					3	16		14		**198**
7:30-7:45	10							9	19		23		**150**
7:45-8:00	19							9	20	4	27		**92**
8:00-8:15								1	3	1			**13**
8:15-8:30			2							3			**8**
8:30-8:45								1		2			**3**
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00													
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12:00-12:15													
12:15-12:30													
12:30-12:45													
12:45-1:00													
1:00-1:15													
1:15-1:30													**5**
1:30-1:45													**10**
1:45-2:00													**32**
2:00-2:15								2			3		**64**
2:15-2:30	2		1								2		**127**
2:30-2:45	14										8		**129**
2:45-3:00	8							5	2		17		**110**
3:00-3:15	8		1					29	25	1	4		**84**
3:15-3:30			1					2	1		3		**23**
3:30-3:45								1	2				**25**
3:45-4:00	1								1	3	1		**33**
4:00-4:15	3		1					1	1	1			**33**
4:15-4:30	1		2						2	2	2		**37**
4:30-4:45			1					2	6		2		**43**
4:45-5:00			2						1	1	2		**57**
5:00-5:15	1		2					1	5		2		**59**
5:15-5:30	3		1					1	1		9		**48**
5:30-5:45	8		6					1	3		7		**33**
5:45-6:00	1		1					2			4		**8**
6:00-6:15													
6:15-6:30													
6:30-6:45													
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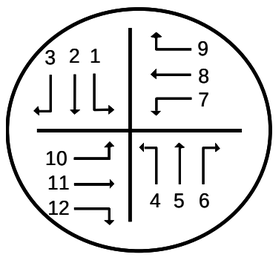
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	100		24					71	113	19	137		
AM PK HR	19		2					11	23	10	27		7:45 AM - 8:45 AM
MID PK HR	16		1					2			13		
PM PK HR	12		11					3	10	1	20		4:45 PM - 5:45 PM



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: MAIN CHURCH ACCESS & FRANKLIN PK
DATE: 12/9/2018
RECORDER: ZHIWAR RASHID - Video Count
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	**FRANKLIN**			**FRANKLIN**			**OVERTON ACCESS**			**CHURCH ACCESS**			
TIME	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	
6:00-6:15 AM													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
7:15-7:30													**88**
7:30-7:45													**207**
7:45-8:00													**309**
8:00-8:15		53	9	2	24								**434**
8:15-8:30		59	13	1	46								**466**
8:30-8:45		47	2		52					1			**479**
8:45-9:00		66	2		57								**547**
9:00-9:15	1	66			53								**570**
9:15-9:30		76	3		53								**585**
9:30-9:45		87	4	4	73				1	1			**639**
9:45-10:00		78	8		56					5		1	**720**
10:00-10:15		73	7		52					3			**765**
10:15-10:30		103	8		72					2		1	**826**
10:30-10:45		135	6	2	104					3		1	**798**
10:45-11:00		87	15	1	84					5		1	**729**
11:00-11:15		80	7		100					8		1	**794**
11:15-11:30	1	74			82							1	**598**
11:30-11:45		79			103								**440**
11:45-12:00 PM		71			186	1							**258**
12:00-12:15													
12:15-12:30													
12:30-12:45													
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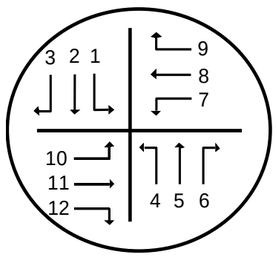
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	2	1,234	84	10	1,197	1			1	28		6	
AM PK HR		389	29	2	284					13		3	9:45 AM - 10:45 AM
MID PK HR	1	304	7		471	1				8		2	11:00 AM - 12:00 PM
PM PK HR													



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: TYNE BLVD & FRANKLIN
DATE: 12/9/2018
RECORDER: ZHIWAR RASHID - Video Count
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	FRANKLIN			FRANKLIN			TYNE			TYNE			
TIME	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	
6:00-6:15 AM													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
7:15-7:30													**105**
7:30-7:45													**246**
7:45-8:00													**367**
8:00-8:15		45	5	18	22	3				2	1	9	**515**
8:15-8:30		39	12	29	40	4				4		13	**530**
8:30-8:45	2	24	8	17	42	6			1	14		7	**560**
8:45-9:00	3	30	8	13	57	13				8	2	14	**619**
9:00-9:15	1	40	5	5	41	2				7	3	16	**651**
9:15-9:30	2	63	7	12	47		1			5	1	33	**695**
9:30-9:45	1	67	13	22	59	1				5		12	**740**
9:45-10:00		68	11	16	39	1				13		32	**827**
10:00-10:15		67	6	22	40	2			1	10		16	**865**
10:15-10:30	2	82	11	21	63	1	6		2	4		24	**916**
10:30-10:45	1	109	16	21	86	2	1		1	11		19	**893**
10:45-11:00	1	66	14	17	65		2		1	19	1	32	**857**
11:00-11:15	2	67	6	17	77		2	1		15		28	**930**
11:15-11:30	2	55	16	12	72					8	1	27	**715**
11:30-11:45	3	70	6	23	91		2		2	12		22	**522**
11:45-12:00 PM		56	8	27	138		14	1	15	10		22	**291**
12:00-12:15													
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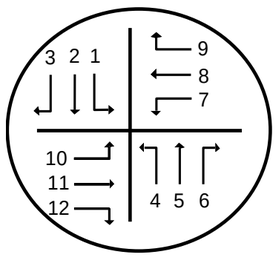
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	20	948	152	292	979	35	28	2	23	147	9	326	
AM PK HR	3	326	44	80	228	6	7		4	38		91	9:45 AM - 10:45 AM
MID PK HR	7	248	36	79	378		18	2	17	45	1	99	11:00 AM - 12:00 PM
PM PK HR													



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Tyne Blvd & West Access
DATE: 12/9/2018
RECORDER: Julie Hornsby - Live Count
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	NA			West Access			Tyne Blvd			Tyne Blvd			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
7:15-7:30													**38**
7:30-7:45													**113**
7:45-8:00													**164**
8:00-8:15		1						13	1	5	18		**207**
8:15-8:30								10		27	38		**206**
8:30-8:45								15		10	26		**192**
8:45-9:00			1					18		3	21		**232**
9:00-9:15			1					8	1	1	26		**314**
9:15-9:30	1		1					8	3	12	36		**334**
9:30-9:45	1		3					20	8	33	26		**333**
9:45-10:00	3		15					29	7	36	35		**312**
10:00-10:15			1					23		2	31		**352**
10:15-10:30	2							28	2	2	26		**391**
10:30-10:45			2					26	2	8	32		**400**
10:45-11:00	17		48					34	1	17	48		**393**
11:00-11:15	11	1	30					29		4	21		**297**
11:15-11:30			6					29			34		**201**
11:30-11:45			2					30			31		**132**
11:45-12:00 PM	1		3					34		1	30		**69**
12:00-12:15													
12:15-12:30													
12:30-12:45													
12:45-1:00													
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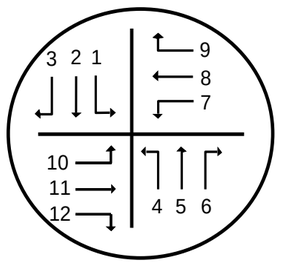
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	36	2	113					354	25	161	479		
AM PK HR	5		18					106	11	48	124		9:45 AM - 10:45 AM
MID PK HR	12	1	41					122		5	116		11:00 AM - 12:00 PM
PM PK HR													



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Tyne Blvd & East Access
DATE: 12/9/2018
RECORDER: Beatriz Francisco - Live Count
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	na			East Access			Tyne			Tyne			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
7:15-7:30													
7:30-7:45													
7:45-8:00													
8:00-8:15		1						14	9	6	12	1	
8:15-8:30	1							10	31	20	15		
8:30-8:45	1		1					14	12	8	21		
8:45-9:00	1							18	3		21		
9:00-9:15								9			26		
9:15-9:30	2							12	7	1	37		
9:30-9:45	2		3					24	11	11	15		
9:45-10:00	19		21					16	10	11	26		
10:00-10:15	3		3					20	5	8	24		
10:15-10:30	2		1					28	6	1	27		
10:30-10:45	2							28	4	5	27		
10:45-11:00	11		20					16	20	21	43		
11:00-11:15	14		9					19	4	6	26		
11:15-11:30	3		1					28	1	1	33		
11:30-11:45	3							30			31		
11:45-12:00 PM	1		1					33	2		31		
12:00-12:15													
12:15-12:30													
12:30-12:45													
12:45-1:00													
1:00-1:15													
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1:45-2:00													
2:00-2:15													
2:15-2:30													
2:30-2:45													
2:45-3:00													
3:00-3:15													
3:15-3:30													
3:30-3:45													
3:45-4:00													
4:00-4:15													
4:15-4:30													
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4:45-5:00													
5:00-5:15													
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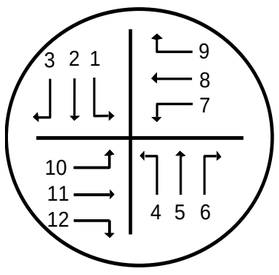
6:30-6:45													
6:45-7:00													
7:00-7:15													
7:15-7:30													
7:30-7:45													
7:45-8:00													
8:00-8:15													
8:15-8:30													
8:30-8:45													
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	65	1	60					319	125	99	415	1	
AM PK HR	26		25					92	25	25	104		9:45 AM - 10:45 AM
MID PK HR	21		11					110	7	7	121		11:00 AM - 12:00 PM
PM PK HR													

43
120
177
220
212
194
203
263
291
297
297
325
340
342
340
277
199
132
68



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Churchwood & Oak Val
DATE: 12/9/2018
RECORDER: Rob Hill - Live Count
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	Road A			Road B			Oak Val			Oak Val			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													**2**
6:15-6:30													**10**
6:30-6:45													**14**
6:45-7:00													**15**
7:00-7:15	1										1		**15**
7:15-7:30	2								2	1	3		**15**
7:30-7:45											4		**9**
7:45-8:00											1		**18**
8:00-8:15										1	1		**27**
8:15-8:30	1										1		**27**
8:30-8:45	6							1	1		5		**25**
8:45-9:00	2							4	1	1	2		**18**
9:00-9:15								1			1		**24**
9:15-9:30													**39**
9:30-9:45	1		1								4		**42**
9:45-10:00	3		1					3	6		3		**37**
10:00-10:15	1							7	8	1			**22**
10:15-10:30			1						1	1			**5**
10:30-10:45			1										**2**
10:45-11:00			1										**1**
11:00-11:15													
11:15-11:30													
11:30-11:45													
11:45-12:00 PM													
12:00-12:15													
12:15-12:30													
12:30-12:45													
12:45-1:00													
1:00-1:15													
1:15-1:30													
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8:00-8:15													
8:15-8:30													
8:30-8:45													
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	17		5					16	19	5	26		
AM PK HR	3		1					5	1	1	7		9:45 AM - 10:45 AM
MID PK HR	1		3					7	9	2			11:00 AM - 12:00 PM
PM PK HR													

APPENDIX C
SIGNAL TIMINGS

ID Number: **3440** ZONE: **D**

Location: **Franklin Pk & Tyne Blvd**

Install Date: 1/17/2017 Address:

Program. By: Switch:

CONTROLLER SETTINGS

ASC3/2100 & COBALT SERIES

ECONOLITE CONTROL PRODUCTS, INC

MM 1-1-1

TP # 1

CONTROLLER PHASE RING SEQUENCE

	PHASE											
RING 1	1	2	3	4	9	10	13	14				
RING 2	5	6	7	8	11	12	15	16				
RING 3												
RING 4												

MM 1-1-3

BACKUP PREVENT PHASES

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
PHASE 1												
PHASE 2												
PHASE 3												
PHASE 4												
PHASE 5												
PHASE 6	X											
PHASE 7												
PHASE 8												
PHASE 9												
PHASE 10												
PHASE 11												
PHASE 12												

MM 1-2

PHASE IN USE & EXCLUSIVE PEDS

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
PH. IN USE	X	X	X	X		X						
EXCL. PED												

MM 2-1

CONTROLLER TIMING PLANS

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
MIN GREEN	10	20	7	7		20						
BK MIN GRN												
CS MGRN												
DELAY GRN												
WALK												
WALK 2												
WALK MAX												
PED CLR												
PED CLR 2												
PED CLR MX												
PED CO												
VEH EXT	2.0	2.0	4.0	4.0		2.0						
VEH EXT2												
MAX 1	10	50	15	40		50						
MAX 2												
MAX 3												
DYM MAX												
DYM STP												
YELLOW	4.5	4.5	3.5	3.5		4.5						
RED CLR	1.5	1.5	2.0	2.0		1.5						
RED MAX												
RED RVT												
ACT B4												
SEC/ACT												
MAX INT												
TIME B4												
CARS WT												
STPTDUC												
TTREDUC												
MIN GAP												

MM 2-2 / MM 2-3

OVERLAPS

PHASE	TYPE	1	2	3	4	5	6	7	8	LG	LY	LR	AG
VEH OL A													
VEH OL B													
VEH OL C													
VEH OL D													
PED OL 01													
PED OL 02													
PED OL 03													
PED OL 04													

MM 2-5

START UP / FLASH DATA

START UP - PHASE	1	2	3	4	5	6	7	8	9	10	11	12
START UP		G				G						
OVERLAPS												

FLASH>MON	Y	FLASH TIME	7	ALL RED	0
PWR START SEQ	1	MUTCD	N	MUTCD Y→G	N

FLASH - PHASE	1	2	3	4	5	6	7	8	9	10	11	12
FLASH - ENTRY				X								
FLASH - EXIT		X				X						
OVERLAP EXIT												

FLASH>MON	Y	EXIT FLASH	G	MIN FLASH	8
MINIMUM RECALL	N	CYCLE THRU PHASES			N

MM 2-6-1

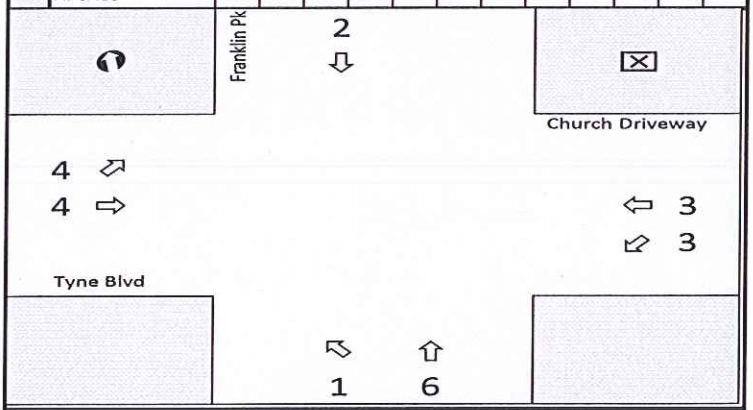
CONTROLLER OPTIONS

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
FLASHING GRN PH												
GUAR PASSAGE												
NON-ACT I												
NON-ACT II												
DUAL ENTRY												
COND. SERVICE												
COND. RESERVICE												
PED RESERVICE												
REST IN WALK												
FLASH WALK												
PED CLR > YEL.												
PED CLR > RED												
IGRN + VEH EXT												

MM 2-8

PHASE DETECTOR OPTIONS

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
LOCK DET												
VE RCALL												
PD RCALL												
MX RCALL	X	X				X						
SF RCALL												
NO REST												
AI CALC												



ID Number: **3440** ZONE: **D**

Location: **Franklin Pk & Tyne Blvd**

Install Date: 1/17/2017 Address:

Program. By: Switch:

CONTROLLER SETTINGS

ASC3/2100 & COBALT SERIES

ECONOLITE CONTROL PRODUCTS, INC.

TP # **1**

CONTROLLER PHASE RING SEQUENCE

MM 1-1-1

PHASE												
RING 1	1	2	3	4	9	10	13	14				
RING 2	5	6	7	8	11	12	15	16				
RING 3												
RING 4												

BACKUP PREVENT PHASES

MM 1-1-3

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
PHASE 1												
PHASE 2												
PHASE 3												
PHASE 4												
PHASE 5												
PHASE 6	X											
PHASE 7												
PHASE 8												
PHASE 9												
PHASE 10												
PHASE 11												
PHASE 12												

PHASE IN USE & EXCLUSIVE PEDS

MM 1-2

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
PH. IN USE	X	X	X	X		X						
EXCL. PED												

CONTROLLER TIMING PLANS

MM 2-1

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
MIN GREEN	10	20	7	7		20						
BK MIN GRN												
CS MGRN												
DELAY GRN												
WALK												
WALK 2												
WALK MAX												
PED CLR												
PED CLR 2												
PED CLR MX												
PED CO												
VEH EXT	2.0	2.0	4.0	4.0		2.0						
VEH EXT2												
MAX 1	10	50	15	40		50						
MAX 2												
MAX 3												
DYM MAX												
DYM STP												
YELLOW	4.5	4.5	3.5	3.5		4.5						
RED CLR	1.5	1.5	2.0	2.0		1.5						
RED MAX												
RED RVT												
ACT B4												
SEC/ACT												
MAX INT												
TIME B4												
CARS WT												
STPTDUC												
TTREDUC												
MIN GAP												

OVERLAPS

MM 2-2 / MM 2-3

PHASE	TYPE	1	2	3	4	5	6	7	8	LG	LY	LR	AG
VEH OL A													
VEH OL B													
VEH OL C													
VEH OL D													
PED OL 01													
PED OL 02													
PED OL 03													
PED OL 04													

START UP / FLASH DATA

MM 2-5

START UP - PHASE	1	2	3	4	5	6	7	8	9	10	11	12
START UP		G				G						
OVERLAPS												

FLASH>MON	Y	FLASH TIME	7	ALL RED	0
PWR START SEQ	1	MUTCD	N	MUTCD Y→G	N

FLASH - PHASE	1	2	3	4	5	6	7	8	9	10	11	12
FLASH - ENTRY				X								
FLASH - EXIT		X				X						
OVERLAP EXIT												

FLASH>MON	Y	EXIT FLASH	G	MIN FLASH	8
MINIMUM RECALL	N	CYCLE THRU PHASES			N

CONTROLLER OPTIONS

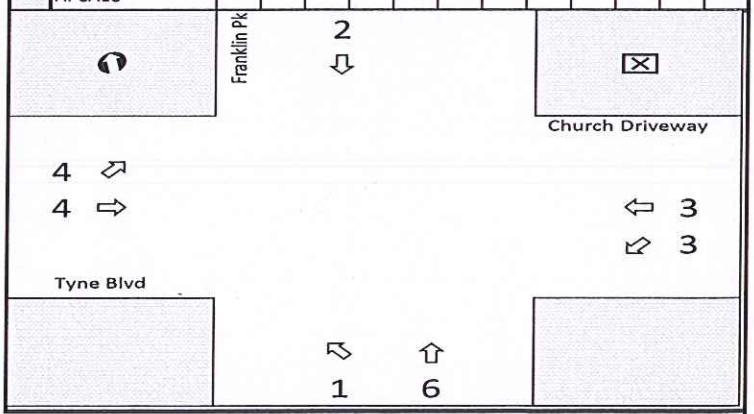
MM 2-6-1

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
FLASHING GRN PH												
GUAR PASSAGE												
NON-ACT I												
NON-ACT II												
DUAL ENTRY												
COND. SERVICE												
COND. RESERVICE												
PED RESERVICE												
REST IN WALK												
FLASH WALK												
PED CLR > YEL.												
PED CLR > RED												
IGRN + VEH EXT												

PHASE DETECTOR OPTIONS

MM 2-8

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
LOCK DET												
VE RCALL												
PD RCALL												
MX RCALL	X	X				X						
SF RCALL												
NO REST												
AI CALC												



ID Number: **3440** ZONE: **D**

Location: **Franklin Pk & Tyne Blvd**

Install Date: 1/17/2017 Address:

Program. By: Switch:

CONTROLLER SETTINGS

ASC3/2100 & COBALT SERIES

ECONOLITE CONTROL PRODUCTS, INC.

MM 1-1-1 — CONTROLLER PHASE RING SEQUENCE

TP # 1

PHASE												
RING 1	1	2	3	4	9	10	13	14				
RING 2	5	6	7	8	11	12	15	16				
RING 3												
RING 4												

MM 1-1-3 — BACKUP PREVENT PHASES

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
PHASE 1												
PHASE 2												
PHASE 3												
PHASE 4												
PHASE 5												
PHASE 6	X											
PHASE 7												
PHASE 8												
PHASE 9												
PHASE 10												
PHASE 11												
PHASE 12												

MM 1-2 — PHASE IN USE & EXCLUSIVE PEDS

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
PH. IN USE	X	X	X	X		X						
EXCL. PED												

MM 2-1 — CONTROLLER TIMING PLANS

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
MIN GREEN	10	20	7	7		20						
BK MIN GRN												
CS MGRN												
DELAY GRN												
WALK												
WALK 2												
WALK MAX												
PED CLR												
PED CLR 2												
PED CLR MX												
PED CO												
VEH EXT	2.0	2.0	4.0	4.0		2.0						
VEH EXT2												
MAX 1	10	50	15	40		50						
MAX 2												
MAX 3												
DYM MAX												
DYM STP												
YELLOW	4.5	4.5	3.5	3.5		4.5						
RED CLR	1.5	1.5	2.0	2.0		1.5						
RED MAX												
RED RVT												
ACT B4												
SEC/ACT												
MAX INT												
TIME B4												
CARS WT												
STPTDUC												
TTREDUC												
MIN GAP												

MM 2-2 / MM 2-3 — OVERLAPS

PHASE	TYPE	1	2	3	4	5	6	7	8	LG	LY	LR	AG
VEH OL A													
VEH OL B													
VEH OL C													
VEH OL D													
PED OL 01													
PED OL 02													
PED OL 03													
PED OL 04													

MM 2-5 — START UP / FLASH DATA

START UP - PHASE	1	2	3	4	5	6	7	8	9	10	11	12
START UP		G				G						
OVERLAPS												

FLASH>MON	Y	FLASH TIME	7	ALL RED	0
PWR START SEQ	1	MUTCD	N	MUTCD Y→G	N

FLASH - PHASE	1	2	3	4	5	6	7	8	9	10	11	12
FLASH - ENTRY				X								
FLASH - EXIT		X				X						
OVERLAP EXIT												

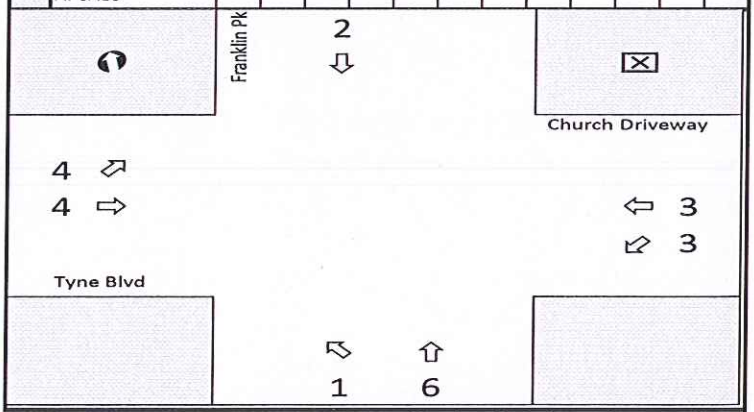
FLASH>MON	Y	EXIT FLASH	G	MIN FLASH	8
MINIMUM RECALL	N	CYCLE THRU PHASES			N

MM 2-6-1 — CONTROLLER OPTIONS

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
FLASHING GRN PH												
GUAR PASSAGE												
NON-ACT I												
NON-ACT II												
DUAL ENTRY												
COND. SERVICE												
COND. RESERVICE												
PED RESERVICE												
REST IN WALK												
FLASH WALK												
PED CLR > YEL.												
PED CLR > RED												
IGRN + VEH EXT												

MM 2-8 — PHASE DETECTOR OPTIONS

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
LOCK DET												
VE RCALL												
PD RCALL												
MX RCALL	X	X				X						
SF RCALL												
NO REST												
AI CALC												



APPENDIX D
CAPACITY ANALYSES

EXISTING CONDITIONS CAPACITY ANALYSES

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	27	11	23	19	2
Future Vol, veh/h	10	27	11	23	19	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	29	12	25	21	2
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.3	6.8	7.3
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	27%	0%	90%
Vol Thru, %	73%	32%	0%
Vol Right, %	0%	68%	10%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	37	34	21
LT Vol	10	0	19
Through Vol	27	11	0
RT Vol	0	23	2
Lane Flow Rate	40	37	23
Geometry Grp	1	1	1
Degree of Util (X)	0.045	0.037	0.027
Departure Headway (Hd)	4.055	3.598	4.192
Convergence, Y/N	Yes	Yes	Yes
Cap	884	995	854
Service Time	2.073	1.619	2.217
HCM Lane V/C Ratio	0.045	0.037	0.027
HCM Control Delay	7.3	6.8	7.3
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.1	0.1

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	35	64	806	634	31
Future Vol, veh/h	13	35	64	806	634	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	38	70	876	689	34

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1283	361	723	0	-	0
Stage 1	706	-	-	-	-	-
Stage 2	577	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	157	636	875	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	525	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	133	636	875	-	-	-
Mov Cap-2 Maneuver	133	-	-	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	443	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.7	1.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	875	-	314	-	-
HCM Lane V/C Ratio	0.08	-	0.166	-	-
HCM Control Delay (s)	9.5	0.6	18.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.3	-	0.6	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	37	5	6	1063	633	24
Future Vol, veh/h	37	5	6	1063	633	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	5	7	1155	688	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1292	357	714	0	-	0
Stage 1	701	-	-	-	-	-
Stage 2	591	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	155	639	882	-	-	-
Stage 1	453	-	-	-	-	-
Stage 2	516	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	152	639	882	-	-	-
Mov Cap-2 Maneuver	152	-	-	-	-	-
Stage 1	453	-	-	-	-	-
Stage 2	505	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	34.5	0.2	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	882	-	167	-	-
HCM Lane V/C Ratio	0.007	-	0.273	-	-
HCM Control Delay (s)	9.1	0.1	34.5	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0	-	1.1	-	-

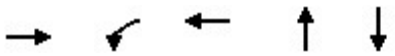
Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	2	5	1064	4	4	634
Future Vol, veh/h	2	5	1064	4	4	634
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	5	1157	4	4	689

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1512	580	0	0	1161	0
Stage 1	1159	-	-	-	-	-
Stage 2	353	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	111	458	-	-	597	-
Stage 1	261	-	-	-	-	-
Stage 2	682	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	110	458	-	-	597	-
Mov Cap-2 Maneuver	110	-	-	-	-	-
Stage 1	261	-	-	-	-	-
Stage 2	674	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.4	0	0.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	241	597	-
HCM Lane V/C Ratio	-	-	0.032	0.007	-
HCM Control Delay (s)	-	-	20.4	11.1	0.1
HCM Lane LOS	-	-	C	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-



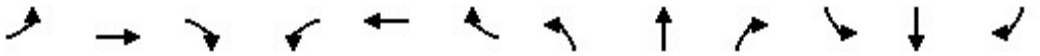
Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	334	3	8	1135	663
v/c Ratio	0.74	0.02	0.05	4.06dl	0.41
Control Delay	38.8	45.3	43.0	1247.5	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	45.3	43.0	1247.5	17.0
Queue Length 50th (ft)	151	2	4	~477	105
Queue Length 95th (ft)	286	12	21	#946	239
Internal Link Dist (ft)	390		345	63	925
Turn Bay Length (ft)					
Base Capacity (vph)	676	186	193	305	1616
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.49	0.02	0.04	3.72	0.41

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	4	139	3	6	1	292	751	2	1	483	126
Future Volume (vph)	165	4	139	3	6	1	292	751	2	1	483	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5		5.5	5.5			6.0			6.0	
Lane Util. Factor		1.00		1.00	1.00			0.95			0.95	
Frt		0.94		1.00	0.98			1.00			0.97	
Flt Protected		0.97		0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1703		1770	1828			3490			3429	
Flt Permitted		0.97		0.95	1.00			0.59			0.95	
Satd. Flow (perm)		1703		1770	1828			2071			3272	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	4	151	3	7	1	317	816	2	1	525	137
RTOR Reduction (vph)	0	28	0	0	1	0	0	0	0	0	18	0
Lane Group Flow (vph)	0	306	0	3	7	0	0	1135	0	0	645	0
Turn Type	Split	NA		Split	NA		Prot	NA		Perm	NA	
Protected Phases	4	4		3	3		1	6			2	
Permitted Phases										2		
Actuated Green, G (s)		22.7		1.3	1.3			54.8			44.7	
Effective Green, g (s)		22.7		1.3	1.3			54.8			44.7	
Actuated g/C Ratio		0.24		0.01	0.01			0.57			0.47	
Clearance Time (s)		5.5		5.5	5.5			6.0			6.0	
Vehicle Extension (s)		4.0		4.0	4.0			2.0			2.0	
Lane Grp Cap (vph)		403		24	24			1245			1526	
v/s Ratio Prot		c0.18		0.00	c0.00			c0.04				
v/s Ratio Perm								c0.48			0.20	
v/c Ratio		0.76		0.12	0.29			4.06dl			0.42	
Uniform Delay, d1		34.0		46.7	46.8			18.3			17.0	
Progression Factor		1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2		8.5		3.2	9.0			11.6			0.9	
Delay (s)		42.5		49.9	55.8			29.9			17.8	
Level of Service		D		D	E			C			B	
Approach Delay (s)		42.5			54.2			29.9			17.8	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	28.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	95.8	Sum of lost time (s)	23.0
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM 2010 analysis expects strict NEMA phasing.

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	266	400	24	42	17
Future Vol, veh/h	14	266	400	24	42	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	70
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	289	435	26	46	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	461	0	-	0	768	448
Stage 1	-	-	-	-	448	-
Stage 2	-	-	-	-	320	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1100	-	-	-	370	611
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	736	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1100	-	-	-	364	611
Mov Cap-2 Maneuver	-	-	-	-	364	-
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	724	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	14.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1100	-	-	-	364	611
HCM Lane V/C Ratio	0.014	-	-	-	0.125	0.03
HCM Control Delay (s)	8.3	0	-	-	16.3	11.1
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0	-	-	-	0.4	0.1

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	268	405	12	12	44
Future Vol, veh/h	55	268	405	12	12	44
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	60	291	440	13	13	48

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	453	0	-	0	858	447
Stage 1	-	-	-	-	447	-
Stage 2	-	-	-	-	411	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1108	-	-	-	327	612
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	669	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1108	-	-	-	306	612
Mov Cap-2 Maneuver	-	-	-	-	306	-
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	626	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	13.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1108	-	-	-	504
HCM Lane V/C Ratio	0.054	-	-	-	0.121
HCM Control Delay (s)	8.4	0	-	-	13.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.4

Intersection	
Intersection Delay, s/veh	3.9
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	17	4	95	0
Demand Flow Rate, veh/h	17	4	96	0
Vehicles Circulating, veh/h	3	92	1	73
Vehicles Exiting, veh/h	70	5	19	23
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.3	3.5	4.0	0.0
Approach LOS	A	A	A	-

Lane	Left	Left	Left	Left
Designated Moves	TR	LT	LTR	T
Assumed Moves	TR	LT	LTR	T
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	17	4	96	0
Cap Entry Lane, veh/h	1127	1031	1129	1050
Entry HV Adj Factor	0.999	0.995	0.985	1.000
Flow Entry, veh/h	17	4	95	0
Cap Entry, veh/h	1125	1026	1112	1050
V/C Ratio	0.015	0.004	0.085	0.000
Control Delay, s/veh	3.3	3.5	4.0	3.4
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Intersection Delay, s/veh	6.9
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	20	3	10	12	11
Future Vol, veh/h	1	20	3	10	12	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	22	3	11	13	12
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.1	6.6	6.9
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	0%	52%
Vol Thru, %	95%	23%	0%
Vol Right, %	0%	77%	48%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	21	13	23
LT Vol	1	0	12
Through Vol	20	3	0
RT Vol	0	10	11
Lane Flow Rate	23	14	25
Geometry Grp	1	1	1
Degree of Util (X)	0.025	0.014	0.027
Departure Headway (Hd)	3.998	3.532	3.816
Convergence, Y/N	Yes	Yes	Yes
Cap	898	1015	941
Service Time	2.009	1.546	1.827
HCM Lane V/C Ratio	0.026	0.014	0.027
HCM Control Delay	7.1	6.6	6.9
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0	0.1

Intersection	
Int Delay, s/veh	22

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	44	156	24	716	1334	37
Future Vol, veh/h	44	156	24	716	1334	37
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	48	170	26	778	1450	40

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1911	745	1490	0	-	0
Stage 1	1470	-	-	-	-	-
Stage 2	441	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	60	357	447	-	-	-
Stage 1	178	-	-	-	-	-
Stage 2	616	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	54	357	447	-	-	-
Mov Cap-2 Maneuver	54	-	-	-	-	-
Stage 1	178	-	-	-	-	-
Stage 2	553	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	250.6	1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	447	-	160	-	-
HCM Lane V/C Ratio	0.058	-	1.359	-	-
HCM Control Delay (s)	13.6	0.6	250.6	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.2	-	13.3	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	14	14	12	721	1462	39
Future Vol, veh/h	14	14	12	721	1462	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	15	13	784	1589	42

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2028	816	1632	0	-	0
Stage 1	1610	-	-	-	-	-
Stage 2	418	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	50	320	394	-	-	-
Stage 1	149	-	-	-	-	-
Stage 2	632	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	47	320	394	-	-	-
Mov Cap-2 Maneuver	47	-	-	-	-	-
Stage 1	149	-	-	-	-	-
Stage 2	595	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	72.8	0.6	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	394	-	82	-	-
HCM Lane V/C Ratio	0.033	-	0.371	-	-
HCM Control Delay (s)	14.5	0.4	72.8	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.1	-	1.4	-	-

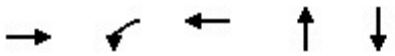
Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	8	725	6	21	1455
Future Vol, veh/h	1	8	725	6	21	1455
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	9	788	7	23	1582

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1627	397	0	0	795	0
Stage 1	791	-	-	-	-	-
Stage 2	836	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	93	602	-	-	822	-
Stage 1	407	-	-	-	-	-
Stage 2	386	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	72	602	-	-	822	-
Mov Cap-2 Maneuver	72	-	-	-	-	-
Stage 1	407	-	-	-	-	-
Stage 2	297	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.2	0	1.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	331	822	-
HCM Lane V/C Ratio	-	-	0.03	0.028	-
HCM Control Delay (s)	-	-	16.2	9.5	1.1
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

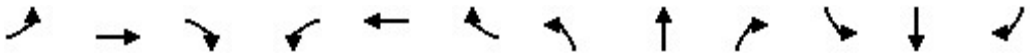


Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	644	9	4	737	1212
v/c Ratio	1.07	0.07	0.03	5.54	0.87
Control Delay	88.8	49.9	44.5	2070.5	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	88.8	49.9	44.5	2070.5	36.5
Queue Length 50th (ft)	~405	5	2	~468	344
Queue Length 95th (ft)	#743	23	13	#665	#588
Internal Link Dist (ft)	390		345	63	905
Turn Bay Length (ft)					
Base Capacity (vph)	601	160	163	133	1397
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.07	0.06	0.02	5.54	0.87

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	214	2	376	8	3	1	134	540	4	2	972	141
Future Volume (vph)	214	2	376	8	3	1	134	540	4	2	972	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5		5.5	5.5			6.0			6.0	
Lane Util. Factor		1.00		1.00	1.00			0.95			0.95	
Frt		0.91		1.00	0.96			1.00			0.98	
Flt Protected		0.98		0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1673		1770	1793			3502			3472	
Flt Permitted		0.98		0.95	1.00			0.51			0.95	
Satd. Flow (perm)		1673		1770	1793			1790			3313	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	233	2	409	9	3	1	146	587	4	2	1057	153
RTOR Reduction (vph)	0	53	0	0	1	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	591	0	9	3	0	0	737	0	0	1203	0
Turn Type	Split	NA		Split	NA		Prot	NA		Perm	NA	
Protected Phases	4	4		3	3		1	6			2	
Permitted Phases										2		
Actuated Green, G (s)		34.6		3.0	3.0			54.2			44.2	
Effective Green, g (s)		34.6		3.0	3.0			54.2			44.2	
Actuated g/C Ratio		0.32		0.03	0.03			0.50			0.41	
Clearance Time (s)		5.5		5.5	5.5			6.0			6.0	
Vehicle Extension (s)		4.0		4.0	4.0			2.0			2.0	
Lane Grp Cap (vph)		532		48	49			954			1345	
v/s Ratio Prot		c0.35		c0.01	0.00			c0.03				
v/s Ratio Perm								0.36			c0.36	
v/c Ratio		1.11		0.19	0.06			0.77			0.89	
Uniform Delay, d1		37.1		51.7	51.5			22.3			30.1	
Progression Factor		1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2		72.9		2.6	0.7			6.1			9.4	
Delay (s)		110.0		54.3	52.3			28.3			39.5	
Level of Service		F		D	D			C			D	
Approach Delay (s)		110.0			53.7			28.3			39.5	
Approach LOS		F			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	53.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	108.8	Sum of lost time (s)	23.0
Intersection Capacity Utilization	106.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 analysis expects strict NEMA phasing.

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	581	264	14	11	14
Future Vol, veh/h	4	581	264	14	11	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	70
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	632	287	15	12	15

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	302	0	-	0	935	295
Stage 1	-	-	-	-	295	-
Stage 2	-	-	-	-	640	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1259	-	-	-	295	744
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	525	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1259	-	-	-	294	744
Mov Cap-2 Maneuver	-	-	-	-	294	-
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	522	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	13.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1259	-	-	-	294	744
HCM Lane V/C Ratio	0.003	-	-	-	0.041	0.02
HCM Control Delay (s)	7.9	0	-	-	17.8	9.9
HCM Lane LOS	A	A	-	-	C	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0.1

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	44	578	270	8	7	27
Future Vol, veh/h	44	578	270	8	7	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	48	628	293	9	8	29

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	302	0	-	0	1022	298
Stage 1	-	-	-	-	298	-
Stage 2	-	-	-	-	724	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1259	-	-	-	261	741
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	480	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	1259	-	-	-	246	741
Mov Cap-2 Maneuver	-	-	-	-	246	-
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	452	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1259	-	-	-	524
HCM Lane V/C Ratio	0.038	-	-	-	0.071
HCM Control Delay (s)	8	0	-	-	12.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Intersection Delay, s/veh	3.6
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	18	2	53	0
Demand Flow Rate, veh/h	18	2	54	0
Vehicles Circulating, veh/h	2	51	1	17
Vehicles Exiting, veh/h	15	4	19	36
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.3	3.4	3.6	0.0
Approach LOS	A	A	A	-

Lane	Left	Left	Left	Left
Designated Moves	TR	LT	LTR	T
Assumed Moves	TR	LT	LTR	T
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	18	2	54	0
Cap Entry Lane, veh/h	1128	1074	1129	1111
Entry HV Adj Factor	0.999	1.000	0.987	1.000
Flow Entry, veh/h	18	2	53	0
Cap Entry, veh/h	1126	1074	1114	1111
V/C Ratio	0.016	0.002	0.048	0.000
Control Delay, s/veh	3.3	3.4	3.6	3.2
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Intersection Delay, s/veh	7
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	7	5	1	3	1
Future Vol, veh/h	1	7	5	1	3	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	8	5	1	3	1
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7	6.9	7
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	12%	0%	75%
Vol Thru, %	88%	83%	0%
Vol Right, %	0%	17%	25%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	8	6	4
LT Vol	1	0	3
Through Vol	7	5	0
RT Vol	0	1	1
Lane Flow Rate	9	7	4
Geometry Grp	1	1	1
Degree of Util (X)	0.01	0.007	0.005
Departure Headway (Hd)	3.972	3.849	3.961
Convergence, Y/N	Yes	Yes	Yes
Cap	906	935	908
Service Time	1.975	1.852	1.967
HCM Lane V/C Ratio	0.01	0.007	0.004
HCM Control Delay	7	6.9	7
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0	0

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	3	2	284	389	29
Future Vol, veh/h	13	3	2	284	389	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	3	2	309	423	32

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	598	227	454	0	-	0
Stage 1	439	-	-	-	-	-
Stage 2	159	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	434	776	1103	-	-	-
Stage 1	617	-	-	-	-	-
Stage 2	853	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	433	776	1103	-	-	-
Mov Cap-2 Maneuver	433	-	-	-	-	-
Stage 1	617	-	-	-	-	-
Stage 2	851	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.9	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1103	-	472	-	-
HCM Lane V/C Ratio	0.002	-	0.037	-	-
HCM Control Delay (s)	8.3	0	12.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

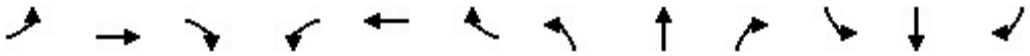
Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	286	0	0	392
Future Vol, veh/h	0	0	286	0	0	392
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	311	0	0	426

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	524	155	0	0	311	0
Stage 1	311	-	-	-	-	-
Stage 2	213	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	483	863	-	-	1246	-
Stage 1	716	-	-	-	-	-
Stage 2	802	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	483	863	-	-	1246	-
Mov Cap-2 Maneuver	483	-	-	-	-	-
Stage 1	716	-	-	-	-	-
Stage 2	802	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	1246	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	1	91	7	0	4	80	228	6	3	326	44
Future Volume (vph)	38	1	91	7	0	4	80	228	6	3	326	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5		5.5	5.5			6.0			6.0	
Lane Util. Factor		1.00		1.00	1.00			0.95			0.95	
Frt		0.91		1.00	0.85			1.00			0.98	
Flt Protected		0.99		0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1662		1770	1583			3484			3475	
Flt Permitted		0.99		0.95	1.00			0.77			0.95	
Satd. Flow (perm)		1662		1770	1583			2716			3313	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	1	99	8	0	4	87	248	7	3	354	48
RTOR Reduction (vph)	0	88	0	0	4	0	0	1	0	0	7	0
Lane Group Flow (vph)	0	53	0	8	0	0	0	341	0	0	398	0
Turn Type	Split	NA		Split	NA		Prot	NA		Perm	NA	
Protected Phases	4	4		3	3		1	6			2	
Permitted Phases										2		
Actuated Green, G (s)		9.2		1.3	1.3			54.5			44.5	
Effective Green, g (s)		9.2		1.3	1.3			54.5			44.5	
Actuated g/C Ratio		0.11		0.02	0.02			0.66			0.54	
Clearance Time (s)		5.5		5.5	5.5			6.0			6.0	
Vehicle Extension (s)		4.0		4.0	4.0			2.0			2.0	
Lane Grp Cap (vph)		186		28	25			1842			1797	
v/s Ratio Prot		c0.03		c0.00	0.00			c0.01				
v/s Ratio Perm								0.11			c0.12	
v/c Ratio		0.29		0.29	0.00			0.94dl			0.22	
Uniform Delay, d1		33.4		39.9	39.7			5.3			9.7	
Progression Factor		1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2		1.2		7.5	0.1			0.2			0.3	
Delay (s)		34.5		47.4	39.8			5.5			10.0	
Level of Service		C		D	D			A			B	
Approach Delay (s)		34.5			44.9			5.5			10.0	
Approach LOS		C			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	82.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	25	104	99	25	26	25
Future Vol, veh/h	25	104	99	25	26	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	70
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	113	108	27	28	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	135	0	-	0	288	121
Stage 1	-	-	-	-	121	-
Stage 2	-	-	-	-	167	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1449	-	-	-	702	930
Stage 1	-	-	-	-	904	-
Stage 2	-	-	-	-	863	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1449	-	-	-	688	930
Mov Cap-2 Maneuver	-	-	-	-	688	-
Stage 1	-	-	-	-	904	-
Stage 2	-	-	-	-	846	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1449	-	-	-	688	930
HCM Lane V/C Ratio	0.019	-	-	-	0.041	0.029
HCM Control Delay (s)	7.5	0	-	-	10.5	9
HCM Lane LOS	A	A	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	0.1

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	48	124	113	11	5	18
Future Vol, veh/h	48	124	113	11	5	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	52	135	123	12	5	20

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	135	0	-	0	368	129
Stage 1	-	-	-	-	129	-
Stage 2	-	-	-	-	239	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1449	-	-	-	632	921
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	801	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1449	-	-	-	607	921
Mov Cap-2 Maneuver	-	-	-	-	607	-
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	770	-

Approach	EB	WB	SB
HCM Control Delay, s	2.1	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1449	-	-	-	828
HCM Lane V/C Ratio	0.036	-	-	-	0.03
HCM Control Delay (s)	7.6	0	-	-	9.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

PROJECTED CONDITIONS WITH IMPROVEMENTS CAPACITY ANALYSES

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	27	11	23	19	2
Future Vol, veh/h	10	27	11	23	19	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	29	12	25	21	2
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.3	6.8	7.3
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	27%	0%	90%
Vol Thru, %	73%	32%	0%
Vol Right, %	0%	68%	10%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	37	34	21
LT Vol	10	0	19
Through Vol	27	11	0
RT Vol	0	23	2
Lane Flow Rate	40	37	23
Geometry Grp	1	1	1
Degree of Util (X)	0.045	0.037	0.027
Departure Headway (Hd)	4.055	3.598	4.192
Convergence, Y/N	Yes	Yes	Yes
Cap	884	995	854
Service Time	2.073	1.619	2.217
HCM Lane V/C Ratio	0.045	0.037	0.027
HCM Control Delay	7.3	6.8	7.3
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.1	0.1

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	35	64	806	634	31
Future Vol, veh/h	13	35	64	806	634	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	38	70	876	689	34

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1283	361	723	0	-	0
Stage 1	706	-	-	-	-	-
Stage 2	577	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	157	636	875	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	525	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	133	636	875	-	-	-
Mov Cap-2 Maneuver	133	-	-	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	443	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.7	1.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	875	-	314	-	-
HCM Lane V/C Ratio	0.08	-	0.166	-	-
HCM Control Delay (s)	9.5	0.6	18.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.3	-	0.6	-	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	37	0	5	2	0	5	6	1058	4	4	629	24
Future Vol, veh/h	37	0	5	2	0	5	6	1058	4	4	629	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	40	0	5	2	0	5	7	1150	4	4	684	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1293	1872	355	1516	1883	577	710	0	0	1154	0	0
Stage 1	705	705	-	1165	1165	-	-	-	-	-	-	-
Stage 2	588	1167	-	351	718	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	120	71	641	82	70	460	885	-	-	601	-	-
Stage 1	393	437	-	206	267	-	-	-	-	-	-	-
Stage 2	462	266	-	639	431	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	116	69	641	79	68	460	885	-	-	601	-	-
Mov Cap-2 Maneuver	116	69	-	79	68	-	-	-	-	-	-	-
Stage 1	384	432	-	201	261	-	-	-	-	-	-	-
Stage 2	446	260	-	627	426	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	47.5	24.4	0.2	0.1
HCM LOS	E	C		

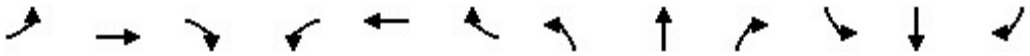
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	885	-	-	129	193	601	-	-
HCM Lane V/C Ratio	0.007	-	-	0.354	0.039	0.007	-	-
HCM Control Delay (s)	9.1	0.1	-	47.5	24.4	11	-	-
HCM Lane LOS	A	A	-	E	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	1.4	0.1	0	-	-

Lane Group	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	183	151	3	8	1135	663
v/c Ratio	1.05	0.52	0.02	0.06	2.00	0.34
Control Delay	129.3	14.7	50.0	47.7	478.5	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	129.3	14.7	50.0	47.7	478.5	11.8
Queue Length 50th (ft)	120	0	2	4	~525	92
Queue Length 95th (ft)	#302	63	12	21	#774	171
Internal Link Dist (ft)	390			345	63	1015
Turn Bay Length (ft)		125				
Base Capacity (vph)	175	292	133	138	567	1940
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.05	0.52	0.02	0.06	2.00	0.34

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	4	139	3	6	1	292	751	2	1	483	126
Future Volume (vph)	165	4	139	3	6	1	292	751	2	1	483	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5	5.5	5.5			6.0			6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			0.95			0.95	
Frt		1.00	0.85	1.00	0.98			1.00			0.97	
Flt Protected		0.95	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1776	1583	1770	1828			3490			3429	
Flt Permitted		0.95	1.00	0.95	1.00			0.60			0.95	
Satd. Flow (perm)		1776	1583	1770	1828			2121			3272	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	4	151	3	7	1	317	816	2	1	525	137
RTOR Reduction (vph)	0	0	137	0	1	0	0	0	0	0	19	0
Lane Group Flow (vph)	0	183	14	3	7	0	0	1135	0	0	644	0
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Perm	NA	
Protected Phases	4	4		3	3		1	6			2	
Permitted Phases			4							2		
Actuated Green, G (s)		10.5	10.5	2.9	2.9			79.8			62.8	
Effective Green, g (s)		10.5	10.5	2.9	2.9			79.8			62.8	
Actuated g/C Ratio		0.10	0.10	0.03	0.03			0.72			0.57	
Clearance Time (s)		5.5	5.5	5.5	5.5			6.0			6.0	
Vehicle Extension (s)		4.0	4.0	4.0	4.0			2.0			2.0	
Lane Grp Cap (vph)		169	150	46	48			1672			1864	
v/s Ratio Prot		c0.10		0.00	c0.00			c0.07				
v/s Ratio Perm			0.01					c0.42			0.20	
v/c Ratio		1.08	0.10	0.07	0.15			0.68			0.35	
Uniform Delay, d1		49.9	45.5	52.3	52.4			8.2			12.7	
Progression Factor		1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2		93.1	0.4	0.8	1.9			2.2			0.5	
Delay (s)		142.9	45.9	53.1	54.4			10.5			13.2	
Level of Service		F	D	D	D			B			B	
Approach Delay (s)		99.0			54.0			10.5			13.2	
Approach LOS		F			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	110.2	Sum of lost time (s)	23.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 analysis expects strict NEMA phasing.

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	266	400	24	42	17
Future Vol, veh/h	14	266	400	24	42	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	70
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	289	435	26	46	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	461	0	-	0	768	448
Stage 1	-	-	-	-	448	-
Stage 2	-	-	-	-	320	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1100	-	-	-	370	611
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	736	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1100	-	-	-	364	611
Mov Cap-2 Maneuver	-	-	-	-	364	-
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	724	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	14.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1100	-	-	-	364	611
HCM Lane V/C Ratio	0.014	-	-	-	0.125	0.03
HCM Control Delay (s)	8.3	0	-	-	16.3	11.1
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0	-	-	-	0.4	0.1

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	268	405	12	12	44
Future Vol, veh/h	55	268	405	12	12	44
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	60	291	440	13	13	48

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	453	0	-	0	858	447
Stage 1	-	-	-	-	447	-
Stage 2	-	-	-	-	411	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1108	-	-	-	327	612
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	669	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1108	-	-	-	306	612
Mov Cap-2 Maneuver	-	-	-	-	306	-
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	626	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	13.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1108	-	-	-	504
HCM Lane V/C Ratio	0.054	-	-	-	0.121
HCM Control Delay (s)	8.4	0	-	-	13.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.4

Intersection	
Intersection Delay, s/veh	3.9
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	17	4	95	0
Demand Flow Rate, veh/h	17	4	96	0
Vehicles Circulating, veh/h	3	92	1	73
Vehicles Exiting, veh/h	70	5	19	23
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.3	3.5	4.0	0.0
Approach LOS	A	A	A	-

Lane	Left	Left	Left	Left
Designated Moves	TR	LT	LTR	T
Assumed Moves	TR	LT	LTR	T
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	17	4	96	0
Cap Entry Lane, veh/h	1127	1031	1129	1050
Entry HV Adj Factor	0.999	0.995	0.985	1.000
Flow Entry, veh/h	17	4	95	0
Cap Entry, veh/h	1125	1026	1112	1050
V/C Ratio	0.015	0.004	0.085	0.000
Control Delay, s/veh	3.3	3.5	4.0	3.4
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Intersection Delay, s/veh	6.9
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	20	3	10	12	11
Future Vol, veh/h	1	20	3	10	12	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	22	3	11	13	12
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.1	6.6	6.9
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	0%	52%
Vol Thru, %	95%	23%	0%
Vol Right, %	0%	77%	48%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	21	13	23
LT Vol	1	0	12
Through Vol	20	3	0
RT Vol	0	10	11
Lane Flow Rate	23	14	25
Geometry Grp	1	1	1
Degree of Util (X)	0.025	0.014	0.027
Departure Headway (Hd)	3.998	3.532	3.816
Convergence, Y/N	Yes	Yes	Yes
Cap	898	1015	941
Service Time	2.009	1.546	1.827
HCM Lane V/C Ratio	0.026	0.014	0.027
HCM Control Delay	7.1	6.6	6.9
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0	0.1

Intersection	
Int Delay, s/veh	22

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	44	156	24	716	1334	37
Future Vol, veh/h	44	156	24	716	1334	37
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	48	170	26	778	1450	40

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1911	745	1490	0	-	0
Stage 1	1470	-	-	-	-	-
Stage 2	441	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	60	357	447	-	-	-
Stage 1	178	-	-	-	-	-
Stage 2	616	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	54	357	447	-	-	-
Mov Cap-2 Maneuver	54	-	-	-	-	-
Stage 1	178	-	-	-	-	-
Stage 2	553	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	250.6	1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	447	-	160	-	-
HCM Lane V/C Ratio	0.058	-	1.359	-	-
HCM Control Delay (s)	13.6	0.6	250.6	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.2	-	13.3	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	0	14	1	0	8	12	713	6	21	1441	39
Future Vol, veh/h	14	0	14	1	0	8	12	713	6	21	1441	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	15	0	15	1	0	9	13	775	7	23	1566	42

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2047	2441	804	1633	2458	391	1609	0	0	782	0	0
Stage 1	1633	1633	-	804	804	-	-	-	-	-	-	-
Stage 2	414	808	-	829	1654	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	33	31	326	67	30	608	402	-	-	832	-	-
Stage 1	105	158	-	343	394	-	-	-	-	-	-	-
Stage 2	586	392	-	331	154	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	25	21	326	48	21	608	402	-	-	832	-	-
Mov Cap-2 Maneuver	25	21	-	48	21	-	-	-	-	-	-	-
Stage 1	99	115	-	323	372	-	-	-	-	-	-	-
Stage 2	545	370	-	230	112	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	177.7	19.1	0.6	0.1
HCM LOS	F	C		

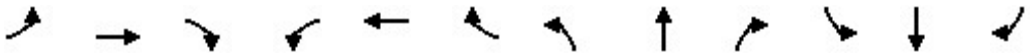
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	402	-	-	46	265	832	-	-
HCM Lane V/C Ratio	0.032	-	-	0.662	0.037	0.027	-	-
HCM Control Delay (s)	14.3	0.4	-	177.7	19.1	9.4	-	-
HCM Lane LOS	B	A	-	F	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	2.5	0.1	0.1	-	-

Lane Group	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	235	409	9	4	737	1212
v/c Ratio	0.71	0.77	0.07	0.03	2.16	0.73
Control Delay	52.7	23.6	51.4	46.0	558.1	24.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.7	23.6	51.4	46.0	558.1	24.8
Queue Length 50th (ft)	137	68	5	2	~394	291
Queue Length 95th (ft)	248	207	24	14	#597	490
Internal Link Dist (ft)	390			345	63	1015
Turn Bay Length (ft)		125				
Base Capacity (vph)	406	583	120	123	341	1670
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.70	0.07	0.03	2.16	0.73

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	214	2	376	8	3	1	134	540	4	2	972	141
Future Volume (vph)	214	2	376	8	3	1	134	540	4	2	972	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5	5.5	5.5			6.0			6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			0.95			0.95	
Frt		1.00	0.85	1.00	0.96			1.00			0.98	
Flt Protected		0.95	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1775	1583	1770	1793			3502			3472	
Flt Permitted		0.95	1.00	0.95	1.00			0.50			0.95	
Satd. Flow (perm)		1775	1583	1770	1793			1752			3313	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	233	2	409	9	3	1	146	587	4	2	1057	153
RTOR Reduction (vph)	0	0	234	0	1	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	235	175	9	3	0	0	737	0	0	1203	0
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Perm	NA	
Protected Phases	4	4		3	3		1	6			2	
Permitted Phases			4							2		
Actuated Green, G (s)		19.3	19.3	2.5	2.5			68.1			52.0	
Effective Green, g (s)		19.3	19.3	2.5	2.5			68.1			52.0	
Actuated g/C Ratio		0.18	0.18	0.02	0.02			0.64			0.49	
Clearance Time (s)		5.5	5.5	5.5	5.5			6.0			6.0	
Vehicle Extension (s)		4.0	4.0	4.0	4.0			2.0			2.0	
Lane Grp Cap (vph)		320	285	41	41			1281			1611	
v/s Ratio Prot		c0.13		c0.01	0.00			c0.05				
v/s Ratio Perm			0.11					0.31			c0.36	
v/c Ratio		0.73	0.61	0.22	0.07			0.58			0.75	
Uniform Delay, d1		41.4	40.4	51.2	51.1			11.1			22.1	
Progression Factor		1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2		9.0	4.4	3.7	1.0			1.9			3.2	
Delay (s)		50.4	44.8	54.9	52.1			13.0			25.3	
Level of Service		D	D	D	D			B			C	
Approach Delay (s)		46.8			54.0			13.0			25.3	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	106.9	Sum of lost time (s)	23.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 analysis expects strict NEMA phasing.

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	581	264	14	11	14
Future Vol, veh/h	4	581	264	14	11	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	70
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	632	287	15	12	15

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	302	0	-	0	935	295
Stage 1	-	-	-	-	295	-
Stage 2	-	-	-	-	640	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1259	-	-	-	295	744
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	525	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1259	-	-	-	294	744
Mov Cap-2 Maneuver	-	-	-	-	294	-
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	522	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	13.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1259	-	-	-	294	744
HCM Lane V/C Ratio	0.003	-	-	-	0.041	0.02
HCM Control Delay (s)	7.9	0	-	-	17.8	9.9
HCM Lane LOS	A	A	-	-	C	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0.1

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	44	578	270	8	7	27
Future Vol, veh/h	44	578	270	8	7	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	48	628	293	9	8	29

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	302	0	-	0	1022	298
Stage 1	-	-	-	-	298	-
Stage 2	-	-	-	-	724	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1259	-	-	-	261	741
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	480	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1259	-	-	-	246	741
Mov Cap-2 Maneuver	-	-	-	-	246	-
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	452	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1259	-	-	-	524
HCM Lane V/C Ratio	0.038	-	-	-	0.071
HCM Control Delay (s)	8	0	-	-	12.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Intersection Delay, s/veh	3.6
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	18	2	53	0
Demand Flow Rate, veh/h	18	2	54	0
Vehicles Circulating, veh/h	2	51	1	17
Vehicles Exiting, veh/h	15	4	19	36
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.3	3.4	3.6	0.0
Approach LOS	A	A	A	-

Lane	Left	Left	Left	Left
Designated Moves	TR	LT	LTR	T
Assumed Moves	TR	LT	LTR	T
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	18	2	54	0
Cap Entry Lane, veh/h	1128	1074	1129	1111
Entry HV Adj Factor	0.999	1.000	0.987	1.000
Flow Entry, veh/h	18	2	53	0
Cap Entry, veh/h	1126	1074	1114	1111
V/C Ratio	0.016	0.002	0.048	0.000
Control Delay, s/veh	3.3	3.4	3.6	3.2
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Certificate of Ownership

I (We) hereby certify that I am (we are) the owner(s) of the property shown hereon as evidenced in Instrument Number: 20210921–0126955, R.O.D.C., Tennessee and adopt the plan of subdivision of the property as shown hereon and dedicate all public ways and easements as noted. No lot or lots as shown hereon shall again be subdivided, altered, or changed so as to produce less area than hereby established until otherwise approved by the City of Oak Hill Planning Commission and under no condition shall such lot or lots be made to produce less area than prescribed by the restrictive covenants as on record in Book _____, Page _____, R.O.D.C., Tennessee, running with the title to the property.

Trustees of the First Presbyterian
Owner Name: Church at Nashville

By: _____ Title: _____

Date: _____

Surveyor's Certificate

We hereby certify to the best of our knowledge, information and belief and in our professional opinion that the hereon shown subdivision plat represents a true and correct survey having an unadjusted ratio of precision of 1:15,000 and is true and correct. Approved monuments have been placed as indicated. All side lot lines are at right angles or radial to a street unless otherwise noted.

Surveyor: _____

MICHAEL H. CHARETTE
REGISTERED LAND SURVEYOR
STATE OF TENNESSEE
AGRICULTURE
COMMERCE
TENNESSEE NO. 2048

Michael H. Charette R.L.S. # 2048

Date: _____

Certificate of Approval for Recording

I hereby certify that the subdivision plat shown hereon has been found to comply with the subdivision regulations of the City of Oak Hill, Davidson County, Tennessee.

By: _____
Oak Hill Planning Commission

Date: _____

Certification of Common Areas Dedication

Trustees of the First Presbyterian Church at Nashville (Owner), in recording this plat, has designated certain areas of land shown hereon as common areas intended for use by the homeowners in Final Plat of First Presbyterian Church, for recreation and related activities. The above–described areas are not dedicated hereby for use by the general public but are dedicated to the common use and enjoyment of the homeowners in Final Plat of First Presbyterian Church, dated August 23, 2022, and recorded with this plat. Said Article _____ is hereby incorporated and made part of this plat.

Trustees of the First Presbyterian
Owner Name: Church at Nashville

By: _____ Title: _____

Date: _____

Legend

- FIRE HYDRANT
- CONCRETE MONUMENT OLD — CM(O)
- IRON ROD NEW — IR(N)
- IRON ROD OLD — IR(O)
- IRON PIPE OLD — IP(O)
- PK NAIL OLD — PK(O)
- CATCH BASIN
- CURB INLET
- BENCHMARK
- MANHOLE
- STORM MANHOLE
- UTILITY POLE
- LIGHT POLE
- PROPERTY LINE
- EDGE OF PAVEMENT
- EASEMENT LINE
- EDGE OF CONC.
- ZONING & OLD PARCEL LINE
- WALL
- CURB
- FENCE — X — X
- OVERHEAD — OH — OH
- WATER LINE — W — 6"
- SEWER LINE — SA — 8"
- GAS LINE — G — 4"
- CULVERT — 18" R.C.P.
- CONTOUR LINE — 650

CHERRY LAND SURVEYING, INC.
622 WEST IRIS DRIVE
NASHVILLE, TENNESSEE 37204
(615)269–3972 FAX:(615)269–9345
E–MAIL: cherryls@comcast.net

GPS Note

A Topcon GRS–1 GPS network rover utilizing the TDOT GNSS Reference Network to establish horizontal control, Tennessee State Plane Grid (NAD–83), and vertical control (NAVD–88) was used for this survey. A positional horizontal accuracy of one (1) centimeter or less and a GPS (Ortho Height) of two (2) centimeters or less may typically be relied upon.

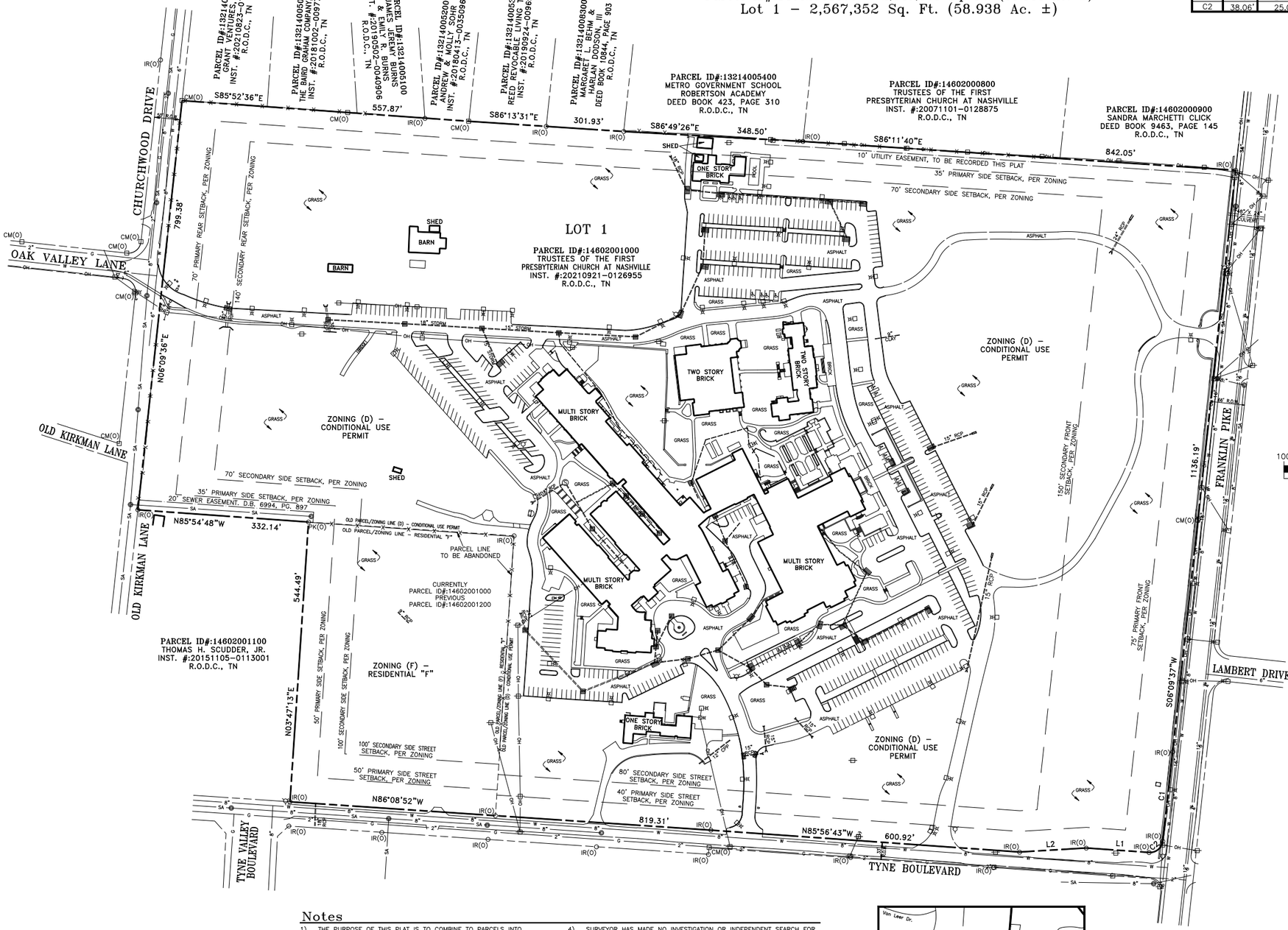
Parcel ID#:14602001200 – 217,794 Sq. Ft. (5.000 Ac. ±)
Parcel ID#:14602001000 – 2,349,558 Sq. Ft. (53.938 Ac. ±)
Lot 1 – 2,567,352 Sq. Ft. (58.938 Ac. ±)

Curve Table

CURVE	LENGTH	RADIUS	BEARING	CHORD	DELTA
C1	174.36'	11427.00'	N06°23'41"E	174.36'	00°52'27"
C2	38.06'	25.00'	N50°26'41"E	34.49'	87°13'12"

Line Table

LINE	BEARING	DISTANCE
L1	N85°56'43"W	122.37'
L2	S86°31'17"W	129.66'



Owner: Trustees of the First
Presbyterian Church of Nashville
4815 Franklin Pike
Nashville, Tennessee 37220

Notes

1) THE PURPOSE OF THIS PLAT IS TO COMBINE TO PARCELS INTO ONE LOT.

2) THIS SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. ABOVE GRADE AND UNDERGROUND UTILITIES SHOWN WERE TAKEN FROM VISIBLE APPURTENANCES AT THE SITE, PUBLIC RECORDS AND/OR MAPS PREPARED BY OTHERS. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES ARE IN THE EXACT LOCATION INDICATED. THEREFORE, RELIANCE UPON THE TYPE, SIZE AND LOCATION OF UTILITIES SHOWN SHOULD BE DONE SO WITH THIS CIRCUMSTANCE CONSIDERED. DETAILED VERIFICATION OF EXISTENCE, LOCATION AND DEPTH SHOULD ALSO BE MADE PRIOR TO ANY DECISION RELATIVE THERETO IS MADE. AVAILABILITY AND COST OF SERVICE SHOULD BE CONFIRMED WITH THE APPROPRIATE UTILITY COMPANY. IN TENNESSEE, IT IS A REQUIREMENT, PER "THE UNDERGROUND UTILITY DAMAGE PREVENT ACT", THAT ANYONE WHO ENGAGES IN EXCAVATION MUST NOTIFY ALL KNOWN UNDERGROUND UTILITY OWNER, NO LESS THAN THREE (3) NOR MORE THAN TEN (10) WORKING DAYS PRIOR TO THE DATE OF THEIR INTENT TO EXCAVATE AND ALSO TO AVOID ANY POSSIBLE HAZARD OR CONFLICT. TENNESSEE ONE CALL 1–800–351–1111 OR TENNESSEE REGULATORY AUTHORITY (TRA) AT 811.

3) ALL DISTANCES WERE MEASURED WITH E.D.M. EQUIPMENT AND HAVE BEEN ADJUSTED FOR TEMPERATURE.

4) SURVEYOR HAS MADE NO INVESTIGATION OR INDEPENDENT SEARCH FOR EASEMENTS OF RECORD, ENCUMBRANCES, RESTRICTIVE COVENANTS, OWNERSHIP TITLE EVIDENCE, OR ANY OTHER FACTS THAT AN ACCURATE AND CURRENT TITLE SEARCH MAY DISCLOSE.

5) THE SURVEYOR'S LIABILITY FOR THIS DOCUMENT SHALL BE LIMITED TO THE ORIGINAL PURCHASER AND THOSE PERSONS LISTED IN THE SURVEYOR'S CERTIFICATE AND DOES NOT EXTEND TO ANY UNNAMED PERSON OR ENTITIES WITHOUT AN EXPRESSED RE–CERTIFICATION BY THE SURVEYOR WHOSE SIGNATURE APPEARS UPON THIS SURVEY.

6) THE LOCATION AND/OR EXISTENCE OF UTILITY SERVICE LINES TO THE PROPERTY SURVEYED ARE UNKNOWN AND ARE NOT SHOWN.

7) NO BUILDING PERMIT SHALL BE ISSUED FOR CONSTRUCTION ON ANY AREA OF 15% OR GREATER SLOPES UNTIL A SITE PLAN MEETING THE REQUIREMENTS OF THE CITY OF OAK HILL'S STEEP SLOPE ORDINANCE (OAK HILL MUNICIPAL CODE SECTION 14–238) HAS BEEN APPROVED BY THE PLANNING COMMISSION.

8) THIS PROPERTY IS CURRENTLY ZONED RESIDENTIAL "F" (F) AND RESIDENTIAL "D" (D) WITH CONDITION USE PERMIT.

9) THIS PARCEL DESCRIBED HEREON DOES NOT LIE WITHIN FLOOD HAZARD AREAS IN ACCORDANCE WITH "INSURANCE RATE MAP PANEL NUMBER 47037C0359H", DATED: APRIL 05, 2017. FLOOD ZONE "X".

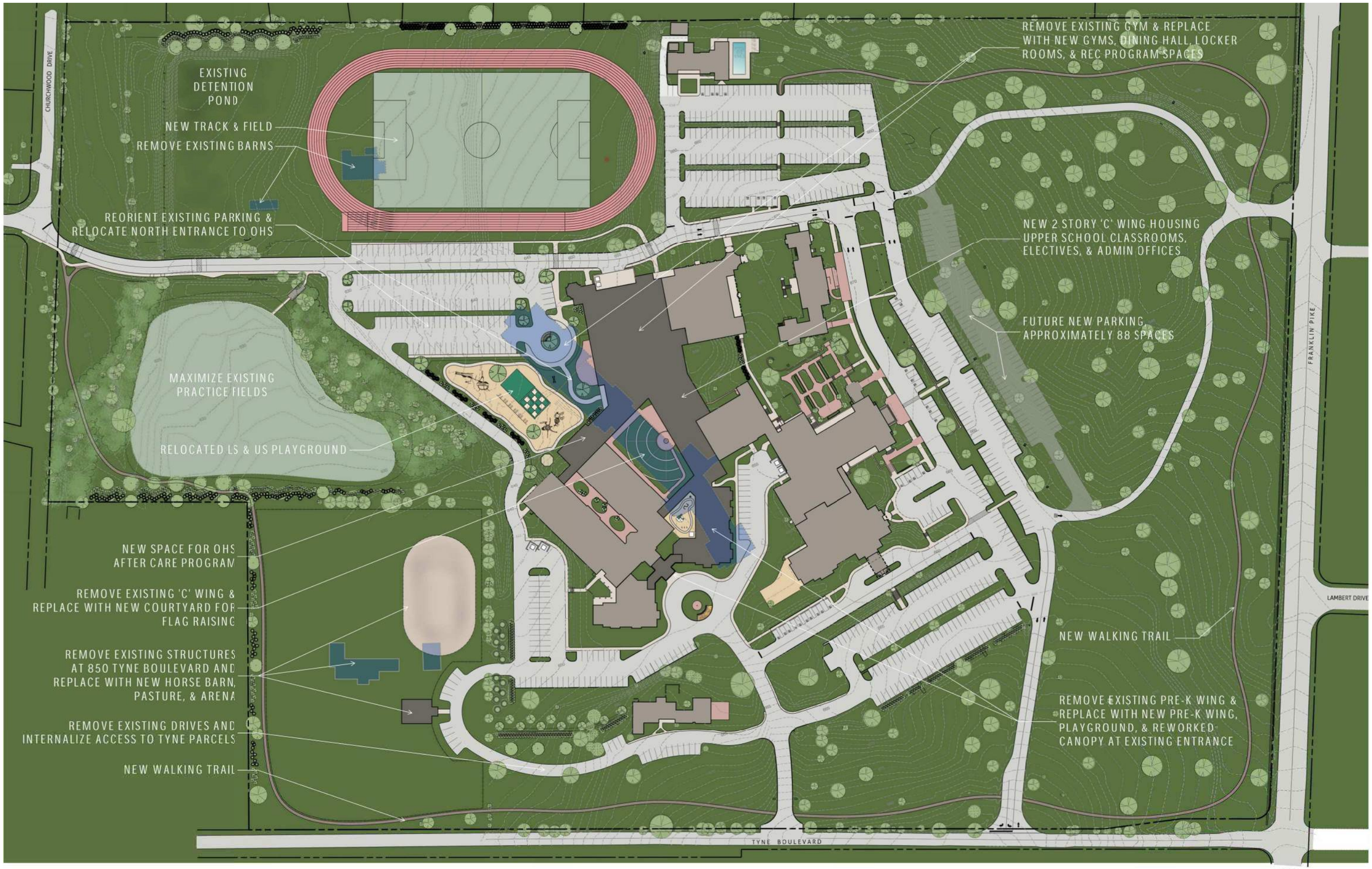
10) FRONT SETBACK NOTE: FOR ANY NEW CONSTRUCTION, THE FRONT SETBACK SHALL BE CALCULATED BASED ON ZONING ORDINANCE SECTION 14–121(F).

Vicinity Map Not to Scale

FINAL PLAT
OF
FIRST PRESBYTERIAN CHURCH
4815 FRANKLIN PIKE
PARCEL ID#:14602001000

INSTRUMENT #:20210921–0126955
CITY OF OAK HILL
NASHVILLE, DAVIDSON COUNTY, TENNESSEE
SCALE: 1"=100' DATED: AUGUST 25, 2022
REVISED: AS PER COMMENTS DATED: OCTOBER 04, 2022

22093PLT CW



first presbyterian CHURCH OF NASHVILLE

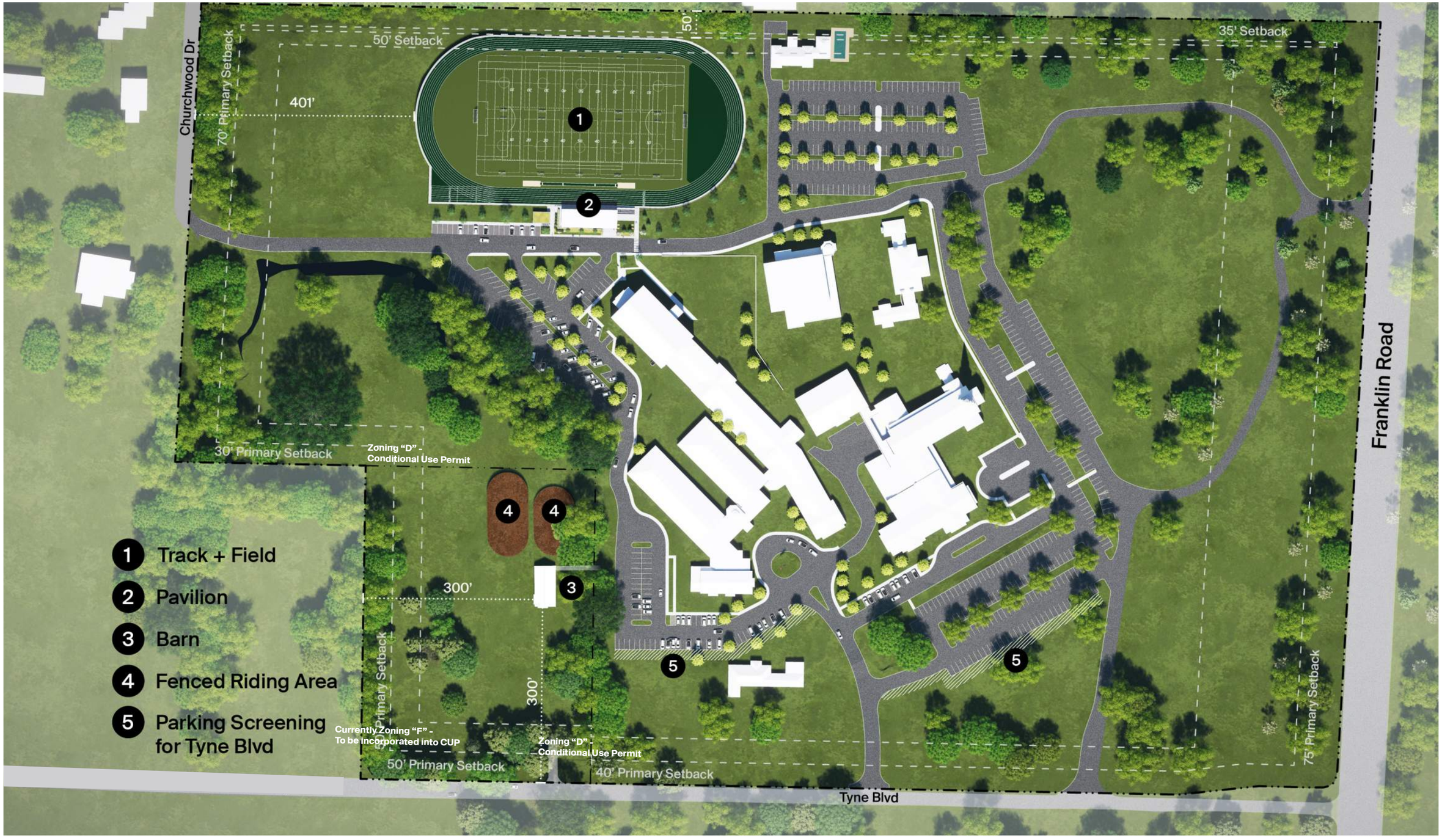
OAK HILL SCHOOL

LONG RANGE MASTER SITE PLAN

UPDATE TO CUP APPROVED BY BZA 02/19/2019

60' 0 60' 120'

orcutt | winslow



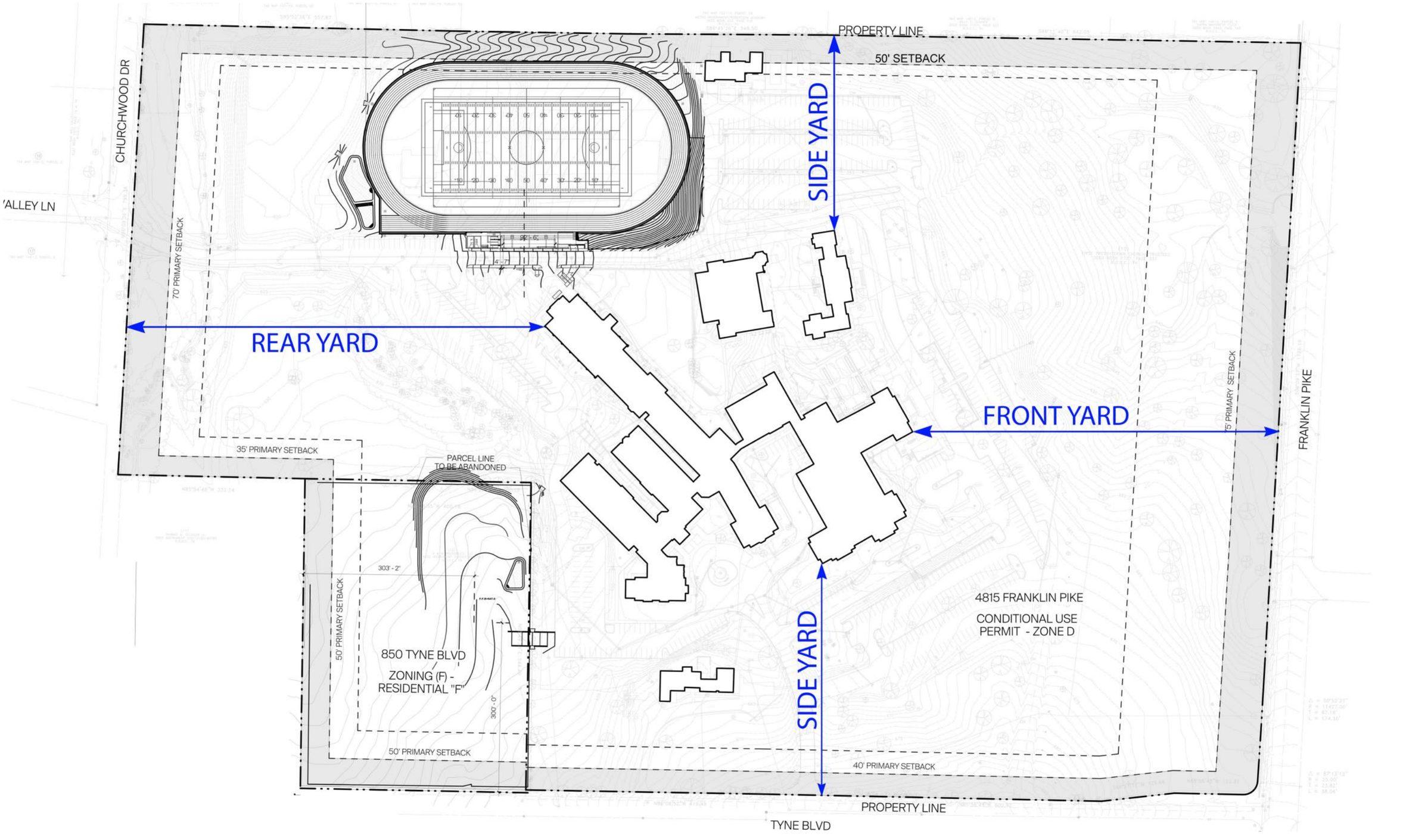
first presbyterian CHURCH OF NASHVILLE

OAK HILL SCHOOL

HASTINGS

0' 40' 80' 160' N

Update to CUP Masterplan



first presbyterian CHURCH OF NASHVILLE

OAK HILL SCHOOL

HASTINGS

0' 40' 80' 160' N

Proposed Site Plan

first presbyterian CHURCH OF NASHVILLE

OAK HILL SCHOOL

HASTINGS

first presbyterian CHURCH OF NASHVILLE

OAK HILL SCHOOL

HASTINGS

first presbyterian CHURCH OF NASHVILLE

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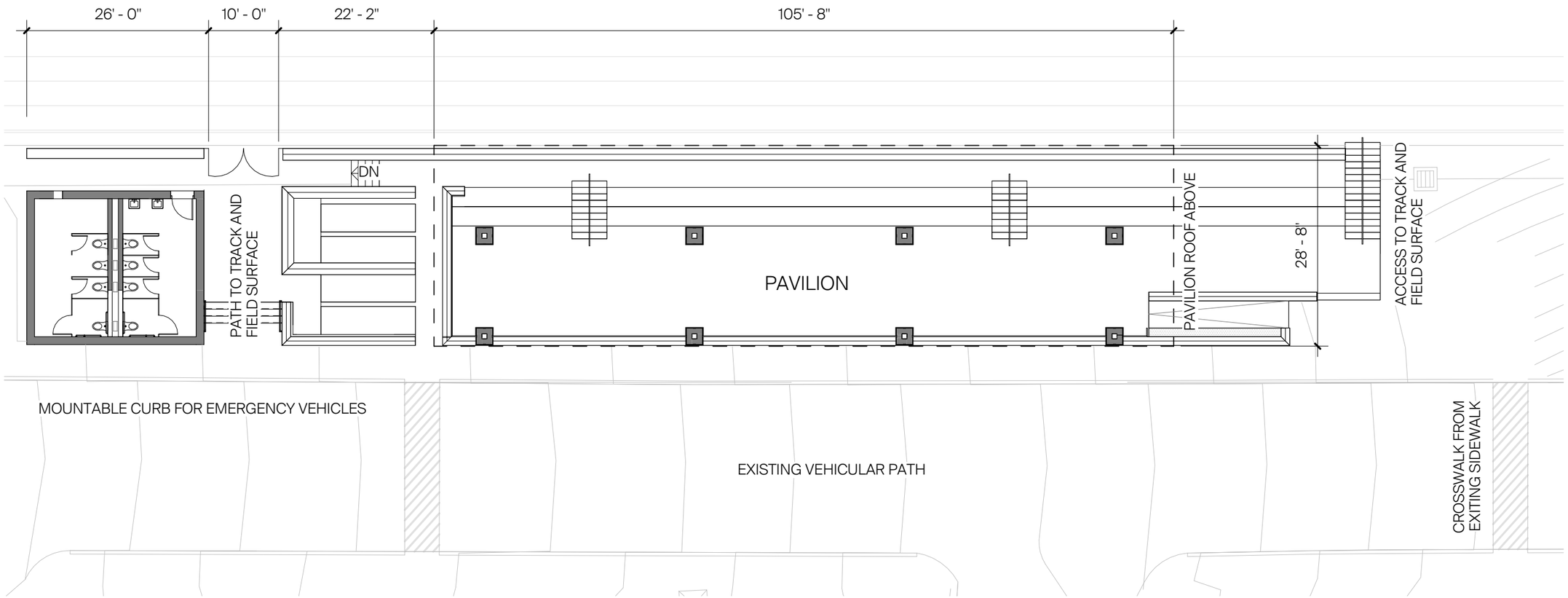
OAK HILL SCHOOL

HASTINGS



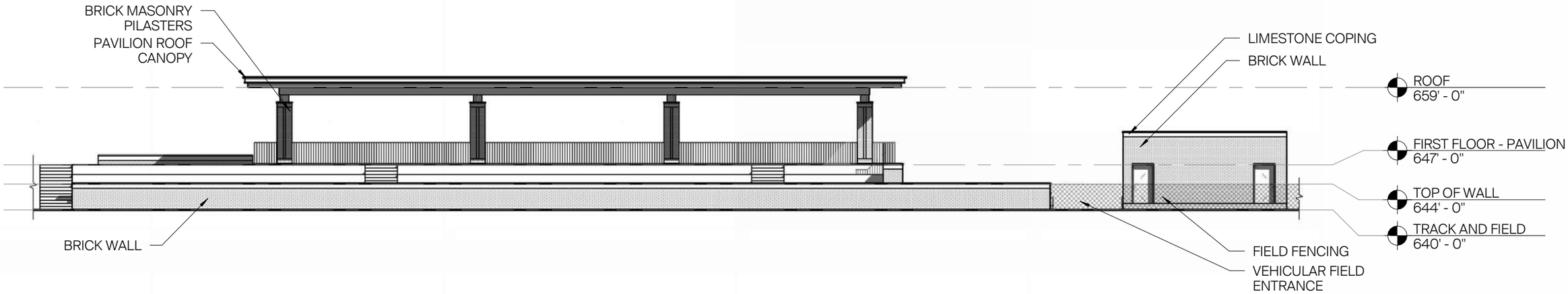
0 8' 16' 32' N

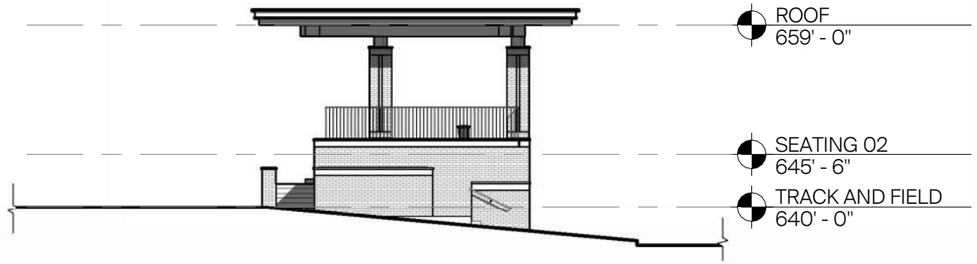
first presbyterian CHURCH OF NASHVILLE

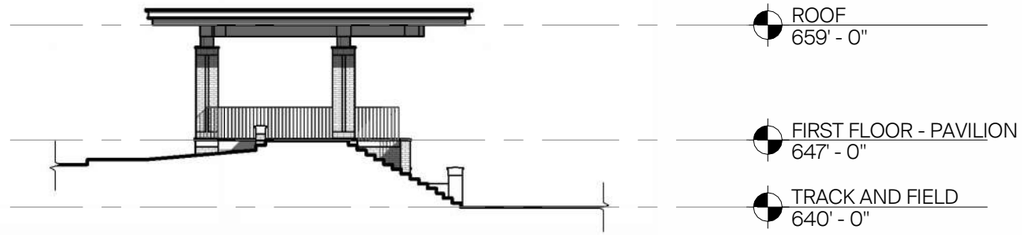
OAK HILL SCHOOL

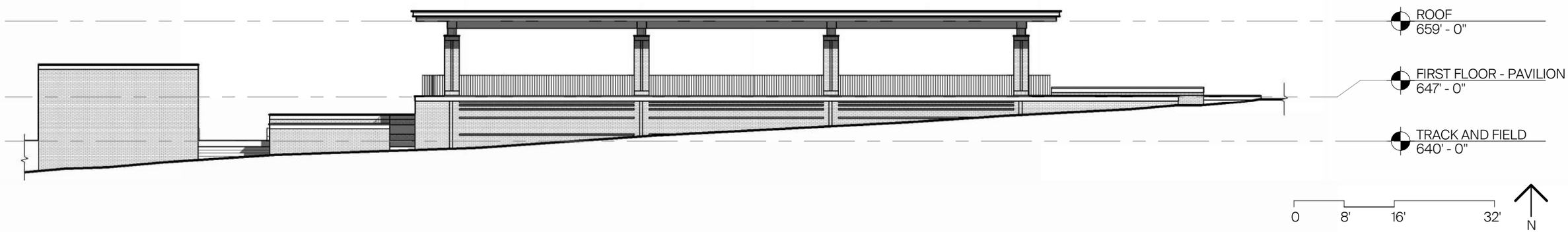
HASTINGS

Floor Plan - Pavilion







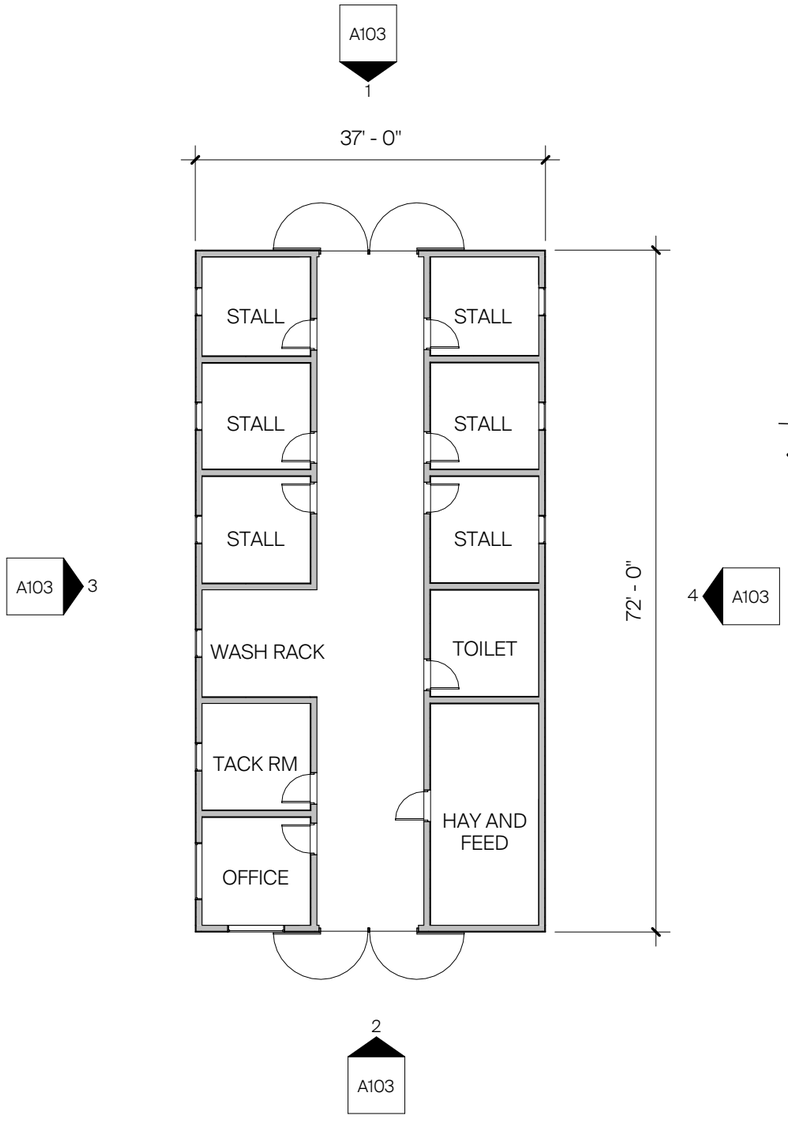


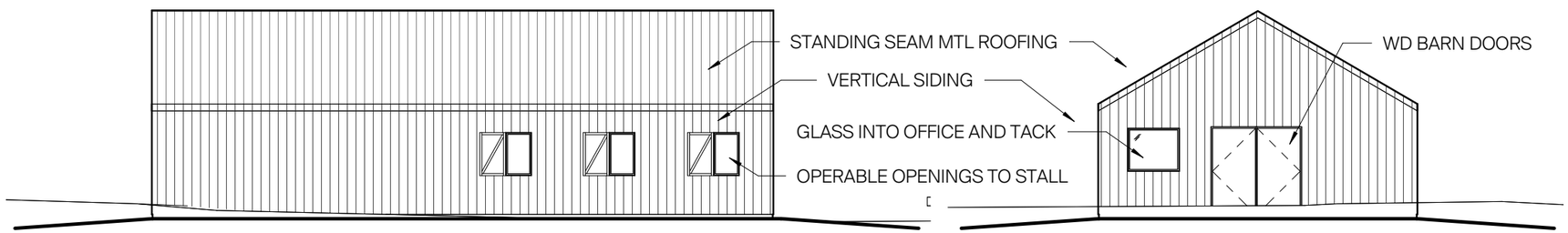
first presbyterian CHURCH OF NASHVILLE

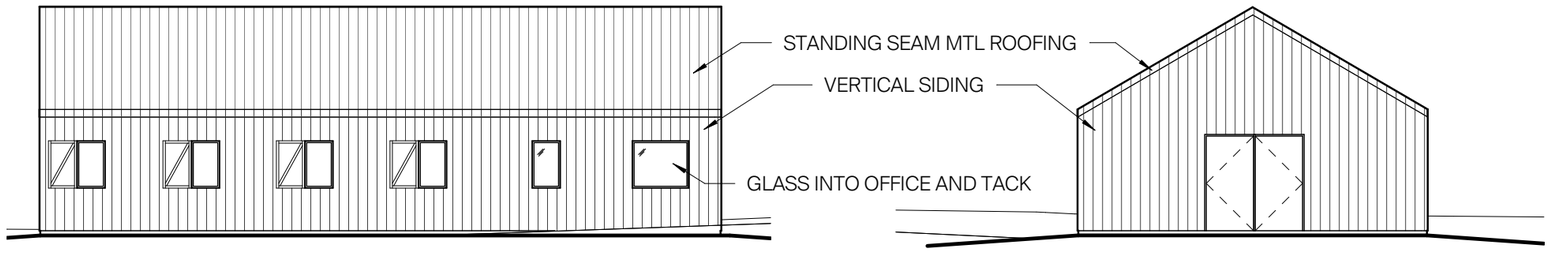
OAK HILL SCHOOL

HASTINGS

Elevations - Pavilion





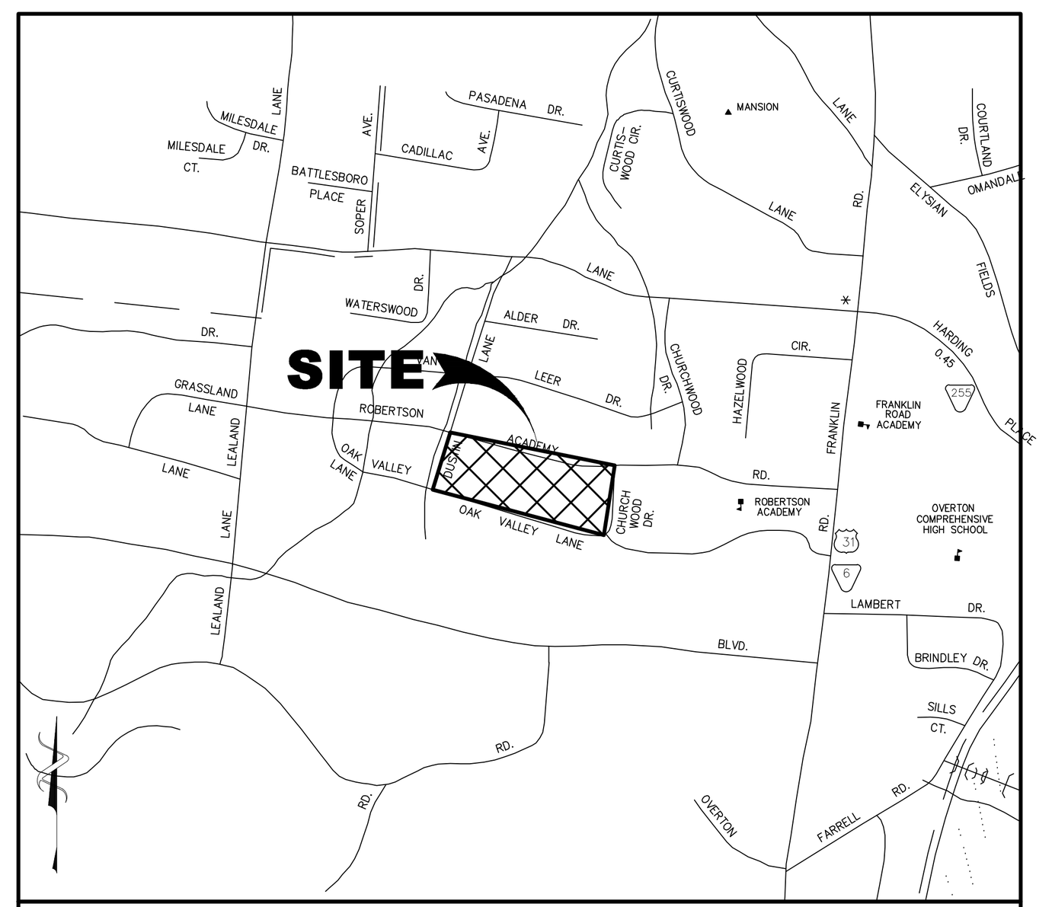


first presbyterian CHURCH OF NASHVILLE

OAK HILL SCHOOL

HASTINGS

Elevations - Equestrian



VICINITY MAP
NOT TO SCALE

MAP 146-02
PARCEL 10
ZONED 8ZZ
COUNCIL DISTRICT: 25
COUNCIL MEMBER: JEFF PREPTIT

OWNER
FIRST PRESBYTERIAN CHURCH
OFFICE OF CAMPUS PLANNING & CONSTRUCTION
4815 FRANKLIN PIKE,
NASHVILLE, TENNESSEE 37220
CONTACT:

SITE AND GRADING ENGINEER
BARGE CIVIL & ASSOCIATES, INC.
6606 CHARLOTTE PIKE, SUITE 210
NASHVILLE, TENNESSEE 37205
CONTACT: SHELLEY LOWE
615-356-9911

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U.S. JUSTICE DEPT.: http://www.justice.gov/crt/housing/about_fairhousingact.htm

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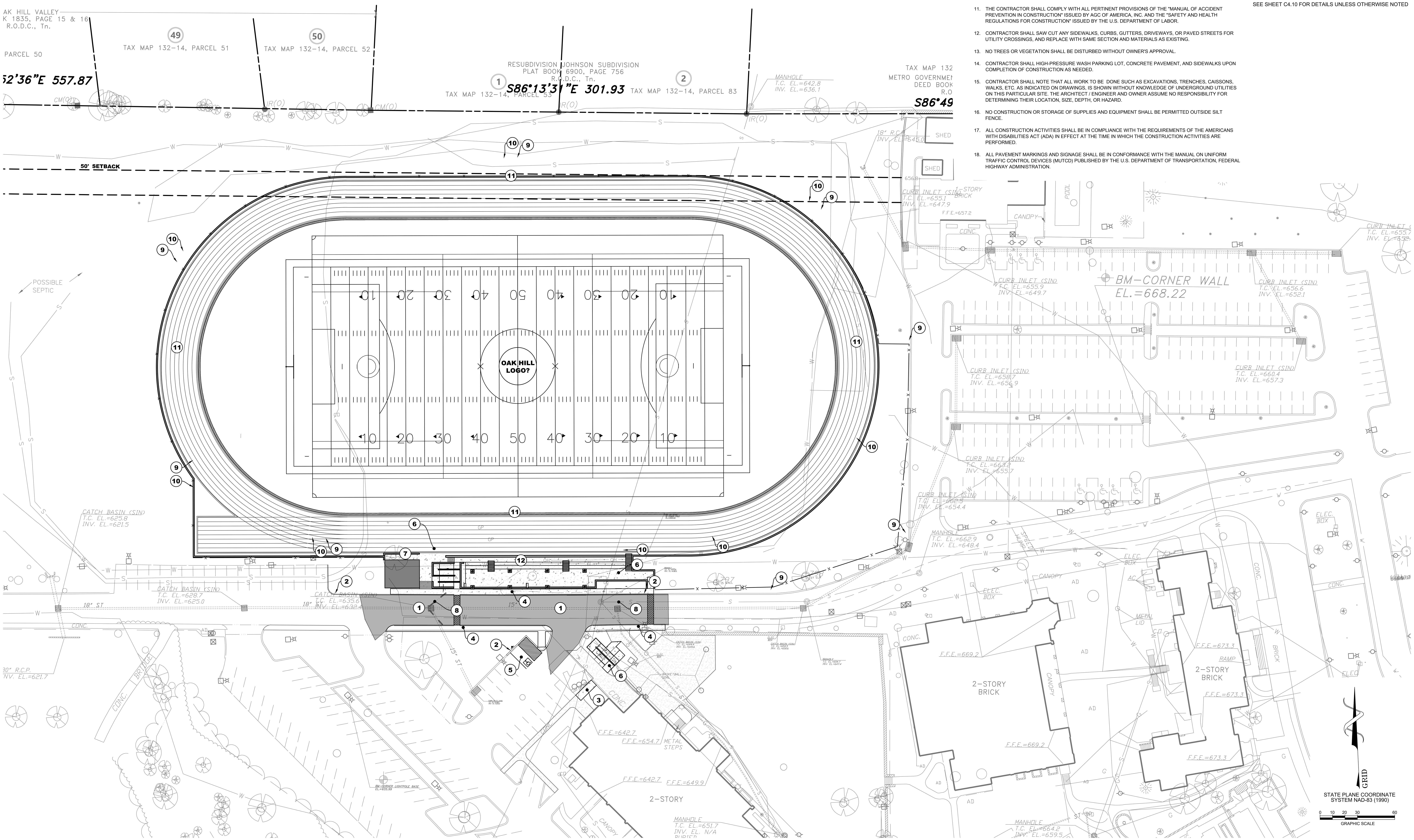
GENERAL CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL CHECK ALL FINISHED GRADES AND DIMENSIONS IN THE FIELD AND REPORT ANY DISCREPANCIES TO THE OWNER'S REPRESENTATIVE PRIOR TO BEGINNING WORK.
2. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES. TAKE CARE TO PROTECT UTILITIES THAT ARE TO REMAIN. REPAIR CONTRACTOR CAUSED DAMAGE ACCORDING TO LOCAL STANDARDS AND AT THE CONTRACTOR'S EXPENSE. COORDINATE ALL CONSTRUCTION WITH THE APPROPRIATE UTILITY COMPANY(S).
3. THE CONTRACTOR SHALL CONFORM TO ALL LOCAL CODES AND OBTAIN ALL PERMITS PRIOR TO BEGINNING WORK.
4. PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING PAVEMENT AND NEW PAVEMENT. FIELD ADJUSTMENT OF FINAL GRADES MAY BE NECESSARY. OBTAIN APPROVAL FROM ENGINEER PRIOR TO ANY DEVIATIONS FROM INTENDED GRADES ON PLANS. INSTALL ALL UTILITIES PRIOR TO INSTALLATION OF PAVEMENT.
5. CONCRETE WALKS AND PADS SHALL HAVE A BROOM FINISH, UNLESS OTHERWISE NOTED. ALL CONCRETE SHALL BE CLASS "A" (4,000 P.S.I.), UNLESS OTHERWISE NOTED.
6. ALL DAMAGE TO EXISTING ASPHALT PAVEMENT, CURB AND GUTTER, AND CONCRETE SIDEWALKS TO REMAIN WHICH RESULTS FROM NEW CONSTRUCTION, SHALL BE REPLACED WITH LIKE MATERIALS AT CONTRACTOR'S EXPENSE.
7. DIMENSIONS ARE TO THE FACE OF CURBS, EDGE OF CONCRETE, OR TO FACE OF BUILDING, UNLESS OTHERWISE NOTED.
8. CONTRACTOR SHALL EXERCISE EXTREME CAUTION IN THE USE OF EQUIPMENT IN AND AROUND OVERHEAD ELECTRICAL WIRES AND SERVICES. IF AT ANY TIME IN THE PURSUIT OF THIS WORK, THE CONTRACTOR MUST WORK IN CLOSE PROXIMITY OF THE ABOVE NOTED WIRES, THE ELECTRICAL COMPANY SHALL BE CONTACTED PRIOR TO SUCH WORK AND THE PROPER SAFETY MEASURES TAKEN.
9. SEE ARCHITECTURAL DRAWINGS FOR EXACT BUILDING DIMENSIONS.
10. IN EASEMENTS AND RIGHTS-OF-WAY, CONTRACTOR SHALL PROTECT AND RESTORE SAID PROPERTY TO A CONDITION SIMILAR OR EQUAL TO THAT EXISTING AT THE COMMENCEMENT OF CONSTRUCTION EXCEPT AS NOTED.
11. THE CONTRACTOR SHALL COMPLY WITH ALL PERTINENT PROVISIONS OF THE "MANUAL OF ACCIDENT PREVENTION IN CONSTRUCTION" ISSUED BY AGC OF AMERICA, INC. AND THE "SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION" ISSUED BY THE U.S. DEPARTMENT OF LABOR.
12. CONTRACTOR SHALL SAW CUT ANY SIDEWALKS, CURBS, GUTTERS, DRIVEWAYS, OR PAVED STREETS FOR UTILITY CROSSINGS, AND REPLACE WITH SAME SECTION AND MATERIALS AS EXISTING.
13. NO TREES OR VEGETATION SHALL BE DISTURBED WITHOUT OWNER'S APPROVAL.
14. CONTRACTOR SHALL HIGH-PRESSURE WASH PARKING LOT, CONCRETE PAVEMENT, AND SIDEWALKS UPON COMPLETION OF CONSTRUCTION AS NEEDED.
15. CONTRACTOR SHALL NOTE THAT ALL WORK TO BE DONE SUCH AS EXCAVATIONS, TRENCHES, CAISSONS, WALKS, ETC. AS INDICATED ON DRAWINGS, IS SHOWN WITHOUT KNOWLEDGE OF UNDERGROUND UTILITIES ON THIS PARTICULAR SITE. THE ARCHITECT / ENGINEER AND OWNER ASSUME NO RESPONSIBILITY FOR DETERMINING THEIR LOCATION, SIZE, DEPTH, OR HAZARD.
16. NO CONSTRUCTION OR STORAGE OF SUPPLIES AND EQUIPMENT SHALL BE PERMITTED OUTSIDE SILT FENCE.
17. ALL CONSTRUCTION ACTIVITIES SHALL BE IN COMPLIANCE WITH THE REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT (ADA) IN EFFECT AT THE TIME IN WHICH THE CONSTRUCTION ACTIVITIES ARE PERFORMED.
18. ALL PAVEMENT MARKINGS AND SIGNAGE SHALL BE IN CONFORMANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) PUBLISHED BY THE U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION.

KEYNOTE TABLE:

1	NEW HEAVY DUTY ASPHALT PAVEMENT
2	NEW 6" POST CURB
3	NEW CONCRETE SIDEWALK
4	NEW INTEGRAL CURB AND SIDEWALK
5	ACCESSIBLE PARKING STALL (TYP.) INCLUDING STRIPING, SIGNAGE, AND WHEEL STOPS
6	ACCESSIBLE RAMP, SEE ARCHITECTURAL PLANS FOR DETAIL
7	PROPOSED BATHROOM FACILITY, SEE ARCHITECTURAL PLANS FOR DETAIL
8	NEW 12" WIDE WHITE PAINTED CROSS WALK
9	NEW FENCE AND GATES, SEE LANDSCAPE PLAN
10	RETAINING WALL, SEE STRUCTURAL PLANS FOR ADDITIONAL INFORMATION
11	PROPOSED TRACK SURFACE
12	PROPOSED PAVILION VIEWING FACILITY, SEE ARCHITECTURAL PLANS FOR DETAIL

SEE SHEET C4.10 FOR DETAILS UNLESS OTHERWISE NOTED



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SITE PLAN

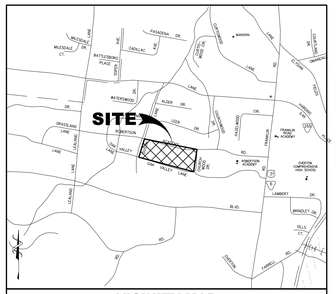
OAK HILL SCHOOL TRACK & FIELD
4815 FRANKLIN PIKE
NASHVILLE, TN, 37220

DATE	DESCRIPTION
1-11-2024	INITIAL BZA SUBMITTAL

C1.00

BCA JOB NO. 2064-121

P:\2064 Hastings\2064-121 Oak Hill Track and Field\Drwg\C1-OAK HILL SCHOOL-SITE.dwg-C1.00 Site Plan



MAP 146-02
PARCEL 10
ZONED 82Z
COUNCIL DISTRICT: 25
COUNCIL MEMBER: JEFF PREPTIT

OWNER
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CONTACT:

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U.S. JUSTICE DEPT.: http://www.justice.gov/crt/housing/about_fairhousingact.htm

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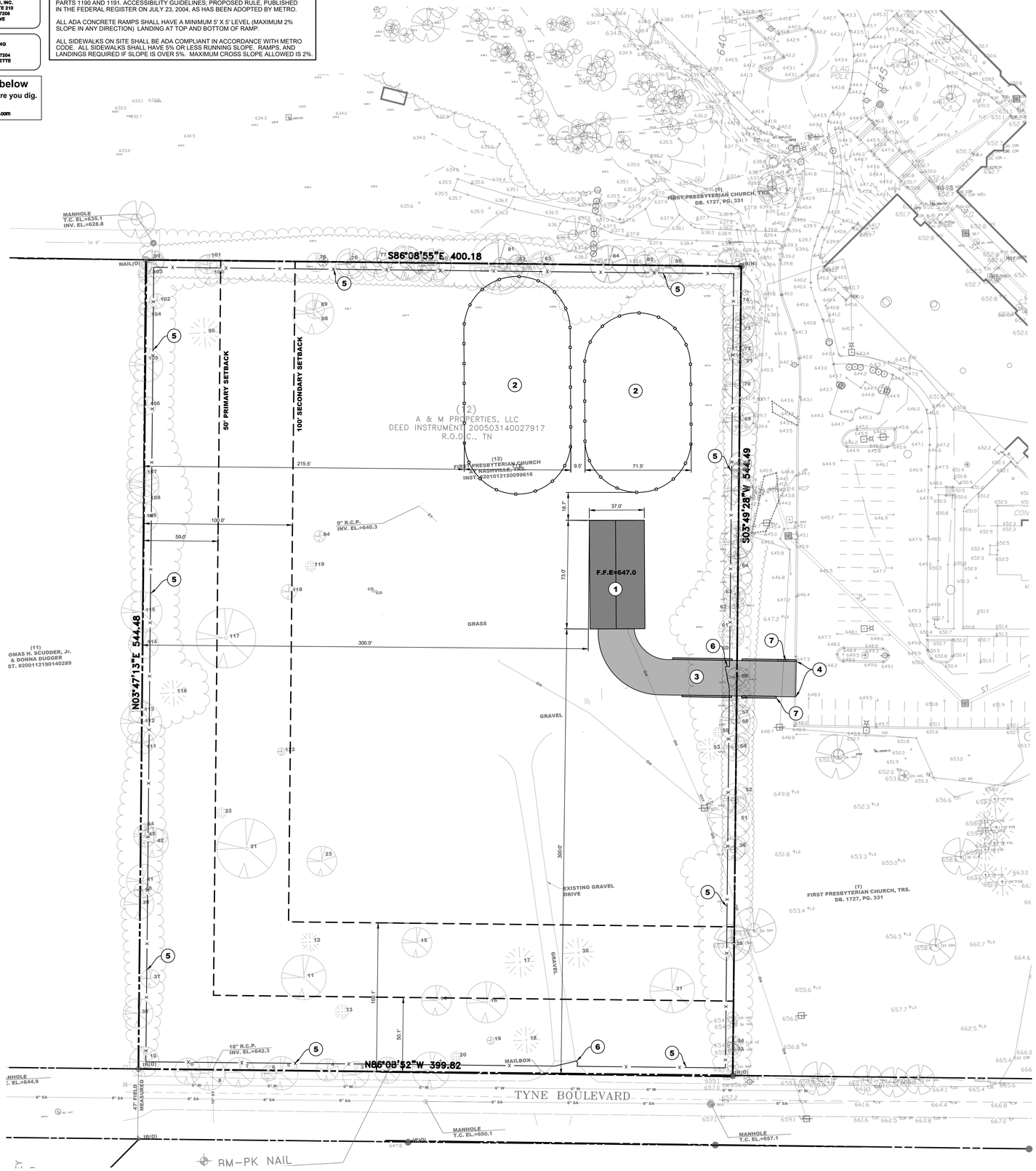
KEYNOTE TABLE:

1. NEW EQUESTRIAN BARN FACILITY, SEE ARCHITECTURAL PLANS FOR DETAIL
2. NEW EQUESTRIAN TURNOUT PADDOCKS, SEE ARCHITECTURAL PLANS FOR DETAIL
3. NEW HEAVY DUTY ASPHALT PAVEMENT
4. REMOVE CURB AND PROVIDE FLUSH ACCESS
5. NEW SITE FENCE, SEE LANDSCAPE PLANS
6. NEW DOUBLE 15' GATE, SEE LANDSCAPE PLANS
7. RETAINING WALL, SEE STRUCTURAL PLANS FOR DETAILS

SEE SHEET C4.10 FOR DETAILS UNLESS OTHERWISE NOTED



STATE PLANE COORDINATE SYSTEM NAD-83 (1990)

0 10 20 30 60
GRAPHIC SCALE

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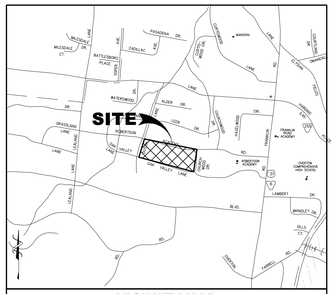
EQUESTRIAN SITE PLAN
OAK HILL SCHOOL TRACK & FIELD
4815 FRANKLIN PIKE
NASHVILLE, TN, 37220

DESCRIPTION	DATE
INITIAL BZA SUBMITTAL	1-11-2024

C1.01

BCA JOB NO. 2064-121

P:\2064 Hastings\2064-121 Oak Hill Track and Field\Dwg\C1-OAK HILL SCHOOL-SITE.dwg-C1.01 Site Plan (Equestrian)



MAP 146-02
PARCEL 10
ZONED R2Z
COUNCIL DISTRICT: 25
COUNCIL MEMBER: JEFF PREPTIT

OWNER
FIRST PRESBYTERIAN CHURCH
OFFICE OF CAMPUS PLANNING & CONSTRUCTION
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NASHVILLE, TENNESSEE 37220
CONTACT:

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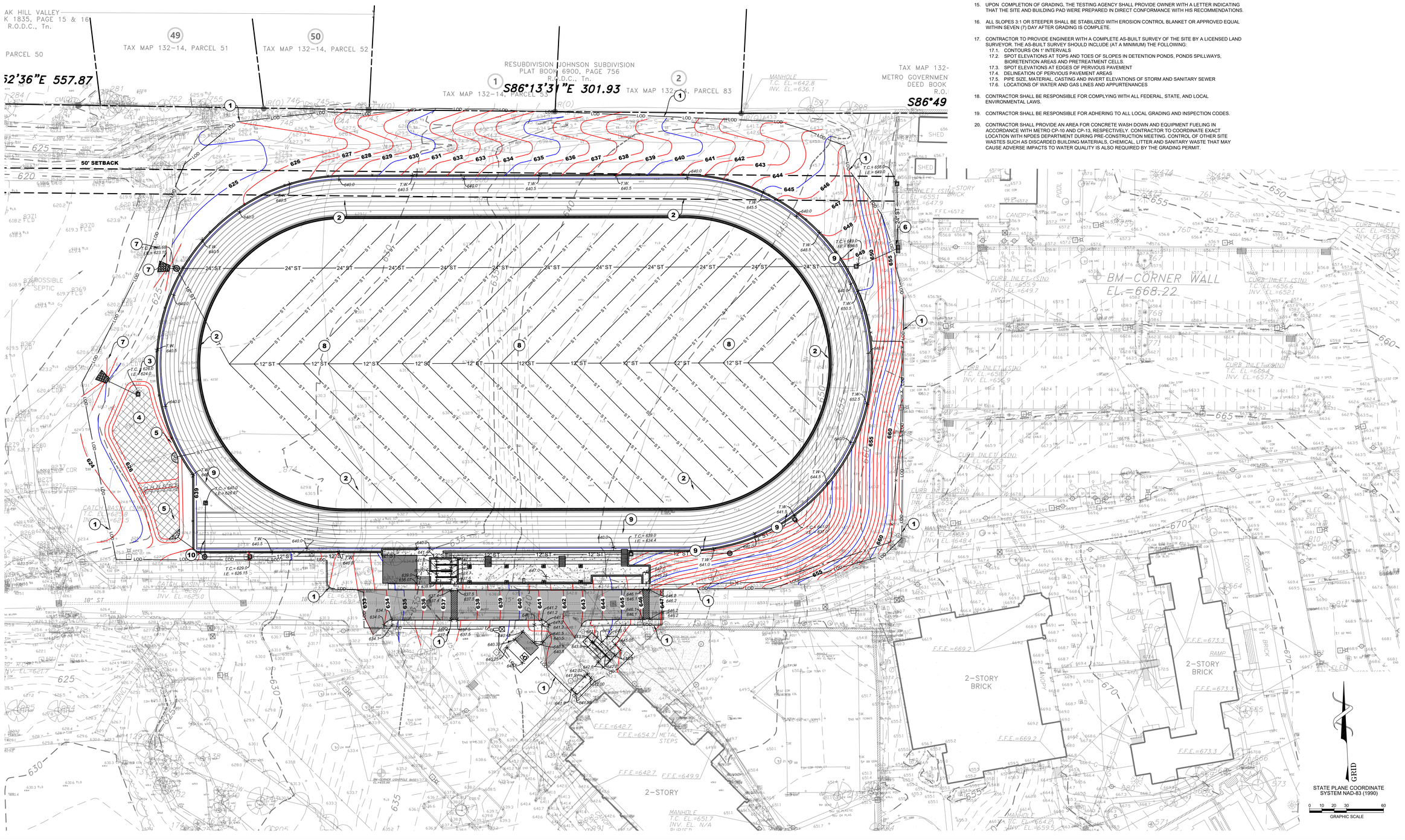
GRADING AND DRAINAGE NOTES:

1. NO TREES ARE TO BE REMOVED AND/OR VEGETATION DISTURBED EXCEPT AS NECESSARY FOR GRADING PURPOSES AND ONLY AS APPROVED BY OWNER'S REPRESENTATIVE.
2. REGARDLESS OF DEPTH, TOPSOIL IS TO BE STRIPPED FROM ALL DISTURBED AREAS, STOCKPILED ONSITE, AND PROPERLY STABILIZED AND PROTECTED. TOPSOIL SHALL BE STABILIZED WITH SEEDING AND MULCH.
3. ALL GRADED AREAS, INCLUDING SLOPES, ARE TO BE MULCHED AND SEEDED WITHIN 14 DAYS AFTER GRADING IS COMPLETED.
4. CONSTRUCT EROSION CONTROL AS SHOWN ON DRAWINGS PRIOR TO BEGINNING GRADING OPERATIONS.
5. ALL NEW AND EXISTING STRUCTURES SHALL HAVE SEDIMENT REMOVED PRIOR TO FINAL ACCEPTANCE.
6. THE CONTRACTOR SHALL PROVIDE THE NECESSARY PROTECTION, IN ACCORDANCE WITH THE SPECIFICATIONS, FOR TREES TO REMAIN. DO NOT OPERATE OR STORE HEAVY EQUIPMENT, NOR HANDLE OR STORE MATERIALS, WITHIN THE DRIP LINES OF TREES TO REMAIN.
7. CONTRACTOR SHALL VERIFY EXISTING ELEVATIONS PRIOR TO BEGINNING WORK.
8. IN THE EVENT OF DISCREPANCIES THE RECOMMENDATIONS OF THE ENGINEER SHALL GOVERN.
9. ALL GRADING OPERATIONS, EXCAVATION, FILL, COMPACTION TESTING AND BACKFILL SHALL BE OBSERVED AND TESTED BY A QUALIFIED TESTING AGENCY.
10. NO FILL SHALL BE PLACED PRIOR TO APPROVAL OF THE SUBGRADE BY THE TESTING AGENCY.
11. COMPACTION SHALL BE DONE IN ACCORDANCE WITH THE RECOMMENDATIONS OF A TESTING AGENCY.
12. COMPACTION TESTS SHALL BE DONE FOR EACH TWO FEET OF FILL, BUT NOT LESS THAN ONE TEST FOR EVERY 500 CUBIC YARDS, OR MORE FREQUENTLY IF REQUIRED BY A TESTING AGENCY. RESULTS OF THE TESTS SHALL BE SUPPLIED TO SITE ENGINEER.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY ADDITIONAL COSTS INCURRED FOR INSPECTION AND TESTING OF SOILS DUE TO FAILURE TO COMPLY WITH THE MINIMUM REQUIREMENTS OF THE TESTING AGENCY.
14. ALL GRADING OPERATIONS SHALL BE STAKED BY A REGISTERED CIVIL ENGINEER OR LICENSED LAND SURVEYOR APPROVED BY THE OWNER.
15. UPON COMPLETION OF GRADING, THE TESTING AGENCY SHALL PROVIDE OWNER WITH A LETTER INDICATING THAT THE SITE AND BUILDING PAD WERE PREPARED IN DIRECT CONFORMANCE WITH HIS RECOMMENDATIONS.
16. ALL SLOPES 3:1 OR STEEPER SHALL BE STABILIZED WITH EROSION CONTROL BLANKET OR APPROVED EQUAL WITHIN SEVEN (7) DAY AFTER GRADING IS COMPLETE.
17. CONTRACTOR TO PROVIDE ENGINEER WITH A COMPLETE AS-BUILT SURVEY OF THE SITE BY A LICENSED LAND SURVEYOR. THE AS-BUILT SURVEY SHOULD INCLUDE (AT A MINIMUM) THE FOLLOWING:
    - 17.1. CONTOURS ON 1' INTERVALS
    - 17.2. SPOT ELEVATIONS AT TOPS AND TOES OF SLOPES IN DETENTION PONDS, PONDS SPILLWAYS, BIORETENTION AREAS AND PRETREATMENT CELLS.
    - 17.3. SPOT ELEVATIONS AT EDGES OF PERVIOUS PAVEMENT
    - 17.4. DELINEATION OF PERVIOUS PAVEMENT AREAS
    - 17.5. PIPE SIZE, MATERIAL, CASTING AND INVERT ELEVATIONS OF STORM AND SANITARY SEWER
    - 17.6. LOCATIONS OF WATER AND GAS LINES AND APPURTENANCES
18. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH ALL FEDERAL, STATE, AND LOCAL ENVIRONMENTAL LAWS.
19. CONTRACTOR SHALL BE RESPONSIBLE FOR ADHERING TO ALL LOCAL GRADING AND INSPECTION CODES.
20. CONTRACTOR SHALL PROVIDE AN AREA FOR CONCRETE WASH DOWN AND EQUIPMENT FUELING IN ACCORDANCE WITH METRO CP-10 AND CP-13, RESPECTIVELY. CONTRACTOR TO COORDINATE EXACT LOCATION WITH NPDES DEPARTMENT DURING PRE-CONSTRUCTION MEETING. CONTROL OF OTHER SITE WASTES SUCH AS DISCARDED BUILDING MATERIALS, CHEMICAL, LITTER AND SANITARY WASTE THAT MAY CAUSE ADVERSE IMPACTS TO WATER QUALITY IS ALSO REQUIRED BY THE GRADING PERMIT.

KEYNOTE TABLE:

1. LIMIT OF DISTURBANCE = 5.56 AC
2. NEW 6" TRENCH DRAIN WITH 8" ROUND OUTLET. TYPE 476D LONGITUDINAL DUCTILE IRON HEEL PROOF GRATE.
3. BIORETENTION POND OUTLET STRUCTURE
4. LEVEL 2 BIORETENTION AREA
5. STONE-END TREATMENT, SEE DETAIL SHEET C4.10
6. TIE NEW XX" PIPE TO EXISTING CATCH BASIN
7. INSTALL ENERGY DISSIPATING HEADWALL
8. SYNTHETIC TURF FIELD W/ UNDERDRAIN SYSTEM
9. NEW 10" NYLOPLAST DRAIN BASIN W/ 10"X12" FITTING.
10. NEW MANHOLE
11. INSTALL RIP-RAP

SEE SHEET C4.10 FOR DETAILS UNLESS OTHERWISE NOTED



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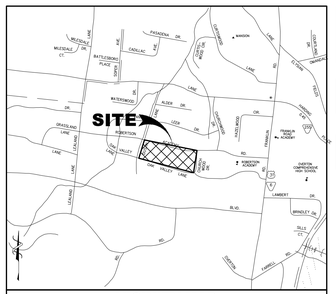
TRACK + FIELD GRADING & DRAINAGE
OAK HILL SCHOOL
4815 FRANKLIN PIKE
NASHVILLE, TN, 37220

DATE	DESCRIPTION
1-11-2024	INITIAL BZA SUBMITTAL

C2.00

BCA JOB NO. 2064-121

P:\2064 Hastings\2064-121 Oak Hill Track and Field\Dwg\Cr\OAK HILL SCHOOL GRAD dwg-C2.00 Grading + Drainage



MAP 146-02
PARCEL 10
ZONED 822
COUNCIL DISTRICT: 25
COUNCIL MEMBER: JEFF PREPTIT

OWNER
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NASHVILLE, TENNESSEE 37220
CONTACT:

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4. LEVEL 2 BIORETENTION AREA
5. STONE-END TREATMENT, SEE DETAIL SHEET C4.10
6. TIE NEW XX" PIPE TO EXISTING CATCH BASIN
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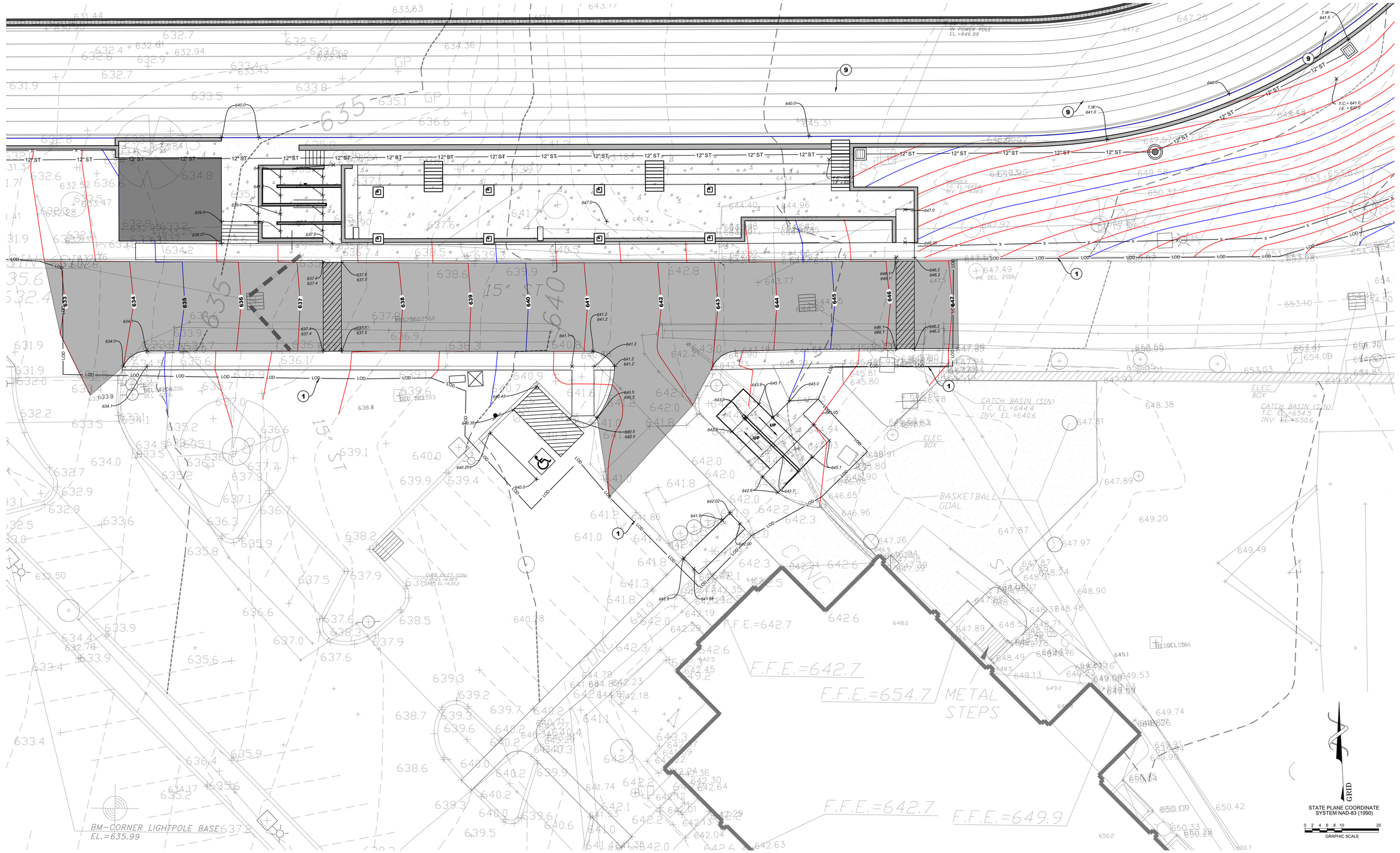
10. NEW MANHOLE

SEE SHEET C4.10 FOR DETAILS UNLESS OTHERWISE NOTED



ACCESSIBILITY PLAN
OAK HILL SCHOOL TRACK & FIELD
4815 FRANKLIN PIKE
NASHVILLE, TN, 37220

BARGE CIVIL ASSOCIATES
6606 CHARLOTTE PIKE, SUITE 210, NASHVILLE, TN 37209
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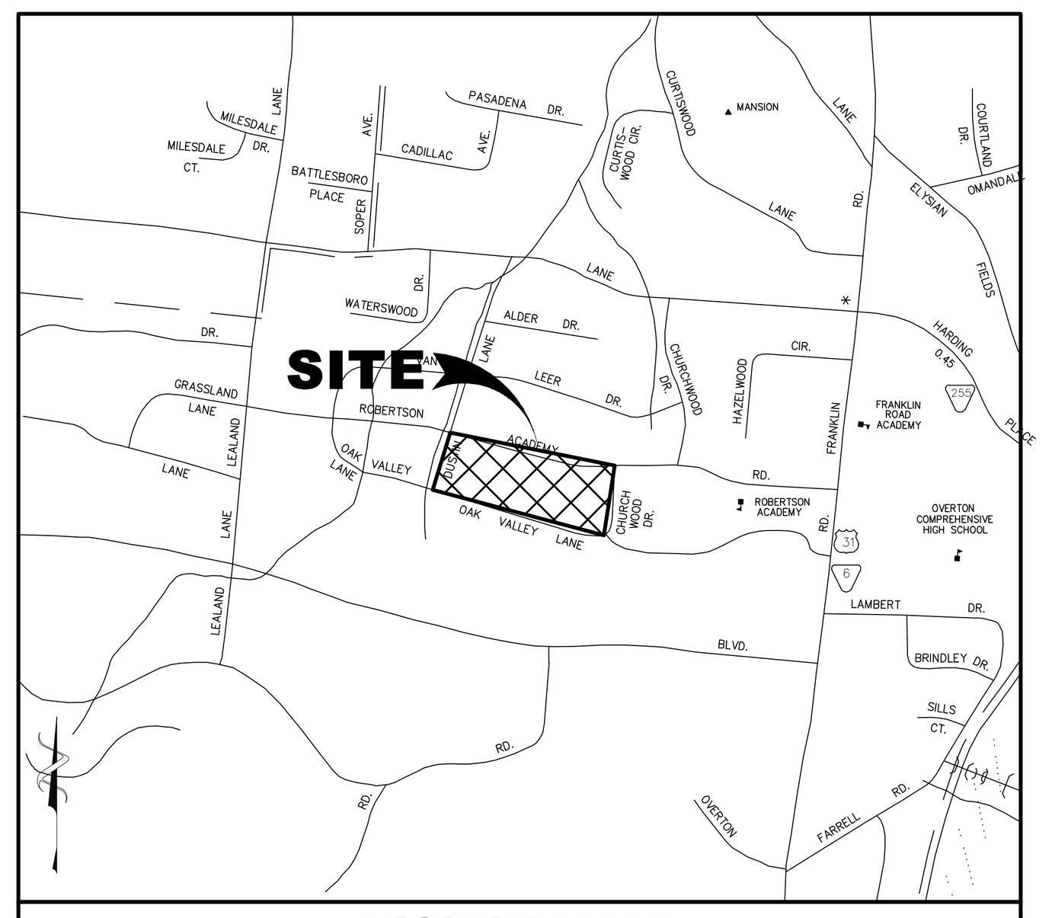
DESCRIPTION	DATE
INITIAL BZA SUBMITTAL	1-11-2024

C2.01

BCA JOB NO. 2064-121



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PARCEL 10
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COUNCIL MEMBER: JEFF PREPTIT

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NASHVILLE, TENNESSEE 37204
CONTACT: MICHAEL CHARETTE
615-269-3972

811 Know what's **below** **Call** before you dig.
811
www.call811.com

FEDERAL COMPLIANCE NOTE:

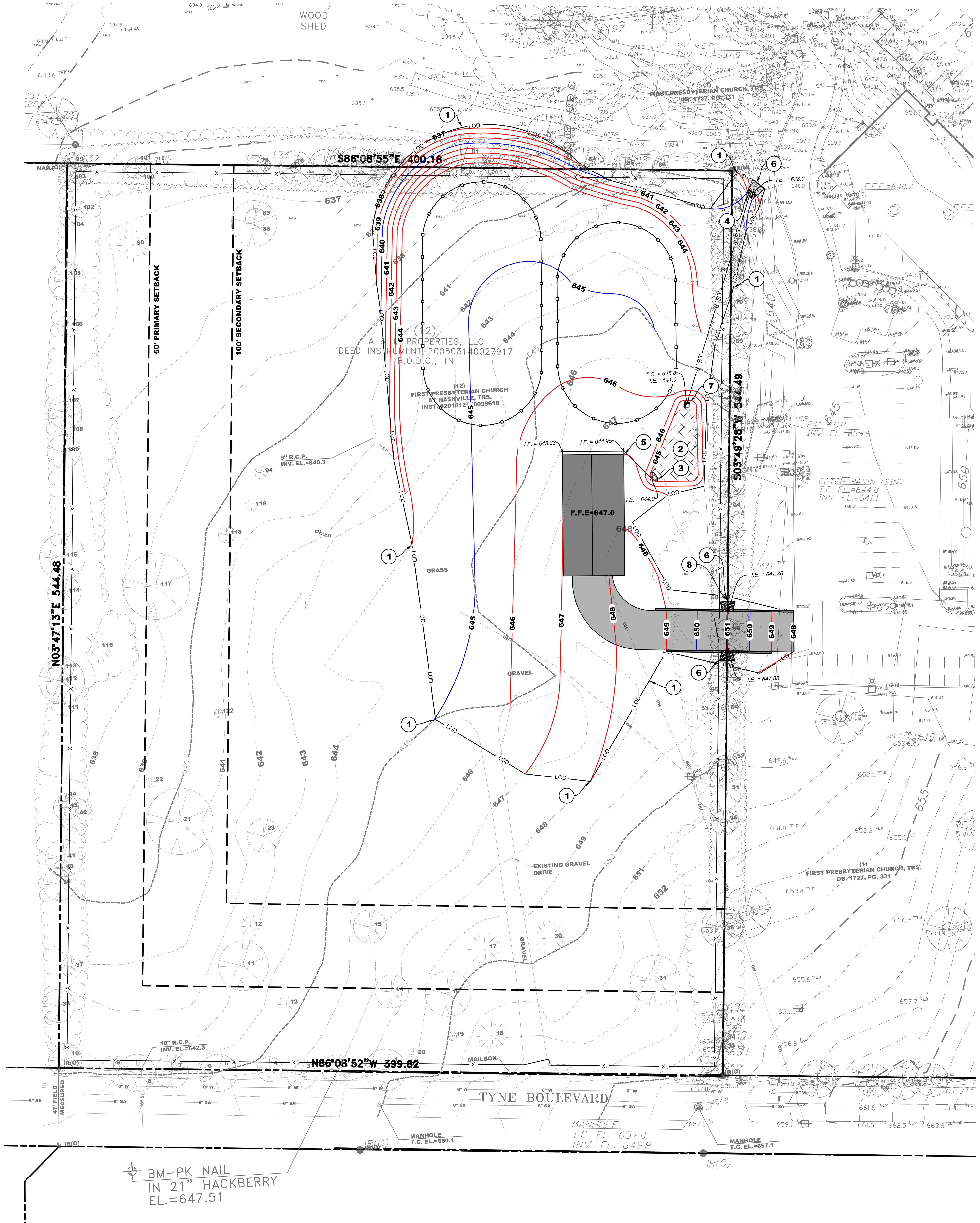
ALL DEVELOPMENT WITHIN THE BOUNDARIES OF THIS PLAN MEETS THE REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT AND THE FAIR HOUSING ACT. ADA: http://www.ada.gov/
U.S. JUSTICE DEPT.: http://www.justice.gov/crt/housing/about_fairhousingact.htm

ADA NOTES

ALL CONSTRUCTION ACTIVITIES SHALL BE COMPLETED IN FULL COMPLIANCE WITH THE AMERICAN DISABILITIES ACT ("ADA") AND ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD, FEDERAL REGISTER 36 CFR PARTS 1190 AND 1191. ACCESSIBILITY GUIDELINES; PROPOSED RULE, PUBLISHED IN THE FEDERAL REGISTER ON JULY 23, 2004, AS HAS BEEN ADOPTED BY METRO.

ALL ADA CONCRETE RAMPS SHALL HAVE A MINIMUM 5' X 5' LEVEL (MAXIMUM 2% SLOPE IN ANY DIRECTION) LANDING AT TOP AND BOTTOM OF RAMP.

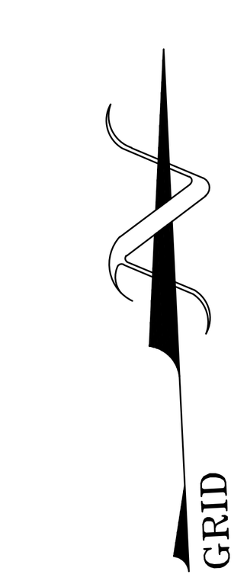
ALL SIDEWALKS ON SITE SHALL BE ADA COMPLIANT IN ACCORDANCE WITH METRO CODE. ALL SIDEWALKS SHALL HAVE 5% OR LESS RUNNING SLOPE. RAMPS, AND LANDINGS REQUIRED IF SLOPE IS OVER 5%. MAXIMUM CROSS SLOPE ALLOWED IS 2%.



KEYNOTE TABLE:

1. LIMIT OF DISTURBANCE = 1.51 AC
2. LEVEL 2 BIORETENTION AREA
3. STONE-END TREATMENT
4. NEW ENERGY DISSIPATING HEADWALL
5. TIE STORM TO ROOF DOWNSPOUTS USING BOOT CONNECTION, SEE ARCHITECTURAL PLANS FOR DETAIL
6. INSTALL RIP-RAP
7. BIORETENTION POND OUTLET STRUCTURE
8. NEW 24" DRIVEWAY CULVERT

SEE SHEET C4.10 FOR DETAILS UNLESS OTHERWISE NOTED



STATE PLANE COORDINATE SYSTEM NAD-83 (1990)

0 10 20 30 60
GRAPHIC SCALE

BCA BARGE CIVIL ASSOCIATES
6606 CHARLOTTE PIKE, SUITE 210, NASHVILLE, TN 37209
615.356.9911 ▾ BCAcivil.com

EQUESTRIAN GRADING & DRAINAGE PLAN

OAK HILL SCHOOL TRACK & FIELD
4815 FRANKLIN PIKE
NASHVILLE, TN, 37220

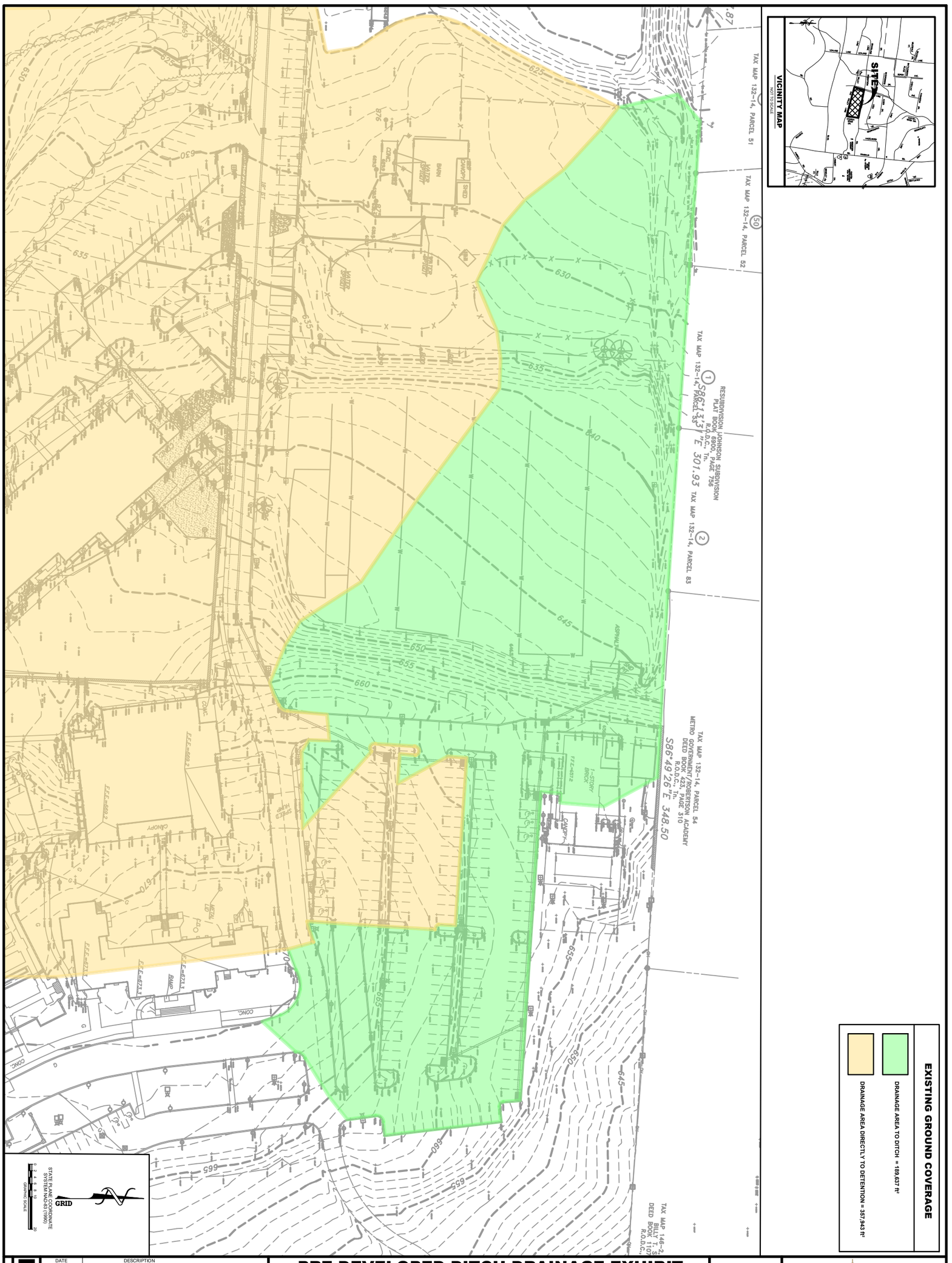
DATE	DESCRIPTION
1-11-2024	INITIAL BZA SUBMITTAL

C2.02

BCA JOB NO. 2064-121

P:\2064 Hastings\2064-121 Oak Hill Track and Field\Drwg\C2-OAK HILL SCHOOL-GRAD.dwg-C2.02 Grading & Drainage (Equestrian)

P:\2064 Hastings\2064-121 Oak Hill Track and Field\Dwg\D0-OAK HILL SCHOOL-DRAINAGE.dwgD2.10 Pre-Dtch Exhibit



DATE	DESCRIPTION
1-11-2024	INITIAL BZA SUBMITTAL

D2.02

BCA JOB NO. 2064-121

PRE-DEVELOPED DITCH DRAINAGE EXHIBIT

OAK HILL SCHOOL TRACK & FIELD

4815 FRANKLIN PIKE
NASHVILLE, TN, 37220

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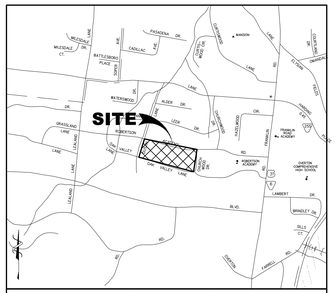

STRUCTURE	BASIN	BASIN AREA (SF)	BASIN AREA (AC)	IMPERVIOUS (C=0.95) (AC)	PERVIOUS (C=0.20) (AC)	WEIGHTED "C"	Tc (min.)	Q10 (CFS)
To Ditch	1	27578	0.63	0.00	0.63	0.20	5.00	0.88
To Detention	2	518739	11.92	8.61	3.31	0.74	5.00	61.63

PROPOSED GROUND COVERAGE

DRAINAGE AREA TO DITCH = 35,572 ft²

DRAINAGE AREA TO BYPASS DITCH = 511,707 ft²

TAX MAP 132-14, PARCEL 51

(50) TAX MAP 132-14, PARCEL 52

RESUBDIVISION JOHNSON SUBDIVISION
PLAT BOOK 6900, PAGE 756
R.O.D.C., Tn.

TAX MAP 132-14, PARCEL 53

S86°13'31"E 301.93

TAX MAP 132-14, PARCEL 83

TAX MAP 132-14, PARCEL 54
METRO GOVERNMENT/ROBERTSON ACADEMY
DEED BOOK 423, PAGE 310
R.O.D.C., Tn.

S86°49'26"E 348.50

OAK HILL LOGO?

1-STORY BRICK

CANOPY

RAMP

STATE PLANE COORDINATE SYSTEM NAD-83 (1990)

GRAPHIC SCALE 0 2 4 6 8 10 20

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POST-DEVELOPED DITCH DRAINAGE EXHIBIT
OAK HILL SCHOOL TRACK & FIELD
4815 FRANKLIN PIKE
NASHVILLE, TN, 37220

DESCRIPTION	DATE
INITIAL BZA SUBMITTAL	1-11-2024

D2.03

BCA JOB NO. 2064-121

P:\2064 Hastings\2064-121 Oak Hill Track and Field\Dwg\DO-OAK HILL SCHOOL-DRAINAGE.dwg-D2.11 Post-Ditch Exhibit