ZONING COMMITTEE STAFF REPORT

FILE # 18-117-556

1. **APPLICANT:** Rehder And Associates on behalf of Twin Cities German Immersion School

2. **TYPE OF APPLICATION:** Site Plan Review **HEARING DATE:** 12/20/2018

3. **LOCATION:** 1031 Como Ave (between Argyle and Churchill)

4. **PIN & LEGAL DESCRIPTION:** 262923220173 Warrendale Subj To Esmt, Vac Alley Accruing And Fol, Beg At The Nw Cor Of Lot 19 Thence Sely On The Nely Lot Line 60 Ft Thence S 78 Ft To Pt 48.5 Ft E At Ra From W Line Of Sd Lot Thence Swly 41.4 Ft To Pt On S Line 25 Ft E At Ra From W Line Thence Wly On SD LINE 28 FT TO SW COR THENCE N 130.7 FT TO POB BEING PT OF LOT 19 ALSO ALL OF LOTS 10 THRU LOT 15 & LOTS 20 THRU LOT 23 BLK 4

5. **PLANNING DISTRICT:** 10 – Como Park Planning Council **PRESENT ZONING:** R4

6. **ZONING CODE REFERENCE:** §61.402(c) *Site plan review and approval.*

7. **STAFF REPORT DATE:** 12/13/2018 **BY:** Tia Anderson

8. **DATE RECEIVED:** 10/23/2018 **DEADLINE FOR ACTION:** 2/20/2019 (extension letter sent)

A. **PURPOSE:** Site Plan for a 3-story, 23,500 square foot building addition to an existing school, play area and stormwater management. The proposed site plan includes removal of a portion of the existing building and east surface parking lot on the site.

B. **PARCEL SIZE:** 77,471 sf, plus 6,020 sf for half the alley (approx. 1.92 acres)

C. **EXISTING LAND USE:** K – 8 school with 587 students and 80.5 FTE staff

D. **SURROUNDING LAND USE:**
North: R4 single-family and duplex
East: R4 single-family and multi-family
South: R4 single-family and institutional
West: R4 single-family

E. **ZONING CODE CITATION:**
§61.402(c) - Findings for site plan review.

F. **HISTORY/DISCUSSION:**
A complete Site Plan application was submitted on October 23, 2018. A Site Plan Review Committee meeting was held for the proposed project on November 13, 2018 and subsequent staff feedback provided on December 13, 2018 (see attached Committee Reports). Site Plan Review is a function delegated by the Saint Paul Planning Commission (PC) to City staff, however, a Site Plan may be referred to Planning Commission for public hearing and decision.

The property is currently developed with a K – 8 school. The applicant is proposing a new 3-story, 23,500 sf building addition for classrooms, gymnasium and cafeteria, as well as expanded green space for use as a play area and infrastructure underneath to manage stormwater run-off from the building addition. The proposed site plan is predicated on removal of the existing Aula (former church) building and east surface parking lot.

An application was submitted by a third-party seeking to designate the former church as historic. The Saint Paul Heritage Preservation Commission (HPC), at a public hearing on November 5, 2018, voted that the former St. Andrew's Church is eligible for local designation as a Saint Paul Heritage Preservation Site. The nomination was forwarded to the Saint Paul Planning Commission for their review and comment and to the State Historic Preservation Office (SHPO). The PC is scheduled to vote on whether historic designation of the site is consistent with the Comprehensive Plan on December 14, 2018. HPC and PC recommendations will be forwarded to the City Council in this designation process. If the former church building is designated, the HPC would review all exterior work at the property.

G. **DISTRICT COUNCIL RECOMMENDATION:**
At the time of the staff report, the Como Park Planning Council (DC 10) has not provided a recommendation to approve or deny the Site Plan. The District Council hosted multiple community meetings regarding future development on the school property.

H. **FINDINGS:** §61.402(c) of the Zoning Code says that in "order to approve the site plan, the planning commission shall consider and find that the site plan is consistent with" the findings listed below:

1. *The city's adopted comprehensive plan and development or project plans for sub-areas of the city.*
On balance, the site plan meets this finding. The *Saint Paul Comprehensive Plan* provides mixed guidance with policies supporting preservation of historic resources, collaboration with schools, and redevelopment.

The HPC has found that the former St. Andrew's Church meets the legislative criteria (Sec. 73.05) for designation, indicating the value of the church as an historic resource. The Historic Preservation Chapter includes the following specific provision:
- 4.3. Protect undesignated historic resources.

Preservation of the former church is also in conformance with similar policies in the *District 10 Como Community Council Plan*, which is an addendum to the Comprehensive Plan. Specifically, the following applies:
- HLU 4.1: Support programs, studies, and policies that serve to preserve its historical character.

However, the proposed site plan is consistent with the *Saint Paul Comprehensive Plan*. The area is a mix of residential and institutional uses and a K – 8 school is a permitted use within the R4 Zoning District. The Land Use Chapter of the Comprehensive Plan acknowledges the importance of education institutions in providing "opportunities for Saint Paul and its residents as well as for those who work in the city." It also acknowledges that "education facilities often provide an identity for specific areas of the city." The Land Use Chapter includes the following specific provision:
- LU 1.55: Collaborate with public and private elementary and secondary schools in conjunction with construction or major remodeling.

The proposed development is consistent with the *Como Park Community Plan* Neighborhood Goals:
- The stable, residential quality of the neighborhood will be maintained with limited, sensitive development and re-development that enhances the residential quality of the neighborhood.
- The neighborhood will be home to a variety of small and medium sized businesses and institutions offering desirable products and services close to home.
- The introduction to the Housing and Land Use chapter identifies that based on the lack of vacant land, "opportunities for development and re-development will by necessity involve the re-use or replacement of current structures."

2. *Applicable ordinances of the City of Saint Paul.*

The site plan as proposed does not meet this finding without variances. The following standards in the R4 zoning district for density, setbacks, height, parking, and design apply:

- §66.216 – Intent, R4 one-family residential district.
- §66.230 – Residential District Density and dimensional standards.
- §66.232 – Maximum lot coverage.
- §63.207 – Parking requirements by use.
- §63.110 – Building design standards.

Type of Use: Schools are a permitted use. The R1—R4 one-family residential districts provide for an environment of predominantly low-density, one-family dwellings along with civic and institutional uses, public services and utilities that serve the residents in the districts.

Setbacks: The site plan meets the minimum setbacks. In R4 the minimum front and rear setback is 25'. The minimum side setback requirement is 9' for non-residential uses.

Height: The site plan does not meet the maximum building height of 3 stories and 30' in a R4 district. Building height is measured from the established grade to the top of the roof deck. The project is proposing a building height up to 33' 1".

Lot Coverage: The site plan does not meets the maximum 35% lot coverage in a residential district. The proposed building area is 36% lot coverage (30,290 sf building area / 83,491 sf lot area including half the alley). One-half the width of a dedicated public alley adjoining the lot shall be considered as part of the lot, for the purpose of applying lot area and density requirements.

Parking: The site plan does not meet the minimum off-street parking requirement based on one space per Full Time Equivalent employee. The expected staff FTEs requires 86 off-street parking spaces (fractional spaces including .5 are disregarded). The project is proposing a 36 space parking deficiency. The site plan includes: 1) 25 existing surface off-street vehicle parking spaces, 2) removal of 7 off-street parking spaces, 3) one required bicycle parking space plus excess bicycle parking of 36 spaces, which allows for a 10% parking reduction, and 4) proposed shared parking for 15 off-street parking spaces with an adjacent church at 1040 Como Ave.

Design standards: Staff has reviewed the site plan in relation to the building design standards and found that all relevant standards are met.

Conditions of Site Plan approval should include:

- Approval of variances for building height and lot coverage, or submittal of an updated site plan that meets Zoning Code density and dimensional standards.
- Approval of a variance for minimum off-street parking.
- No net loss of off-street parking within the property.

3. *Preservation of unique geologic, geographic or historically significant characteristics of the city and environmentally sensitive areas.*

The site plan meets this finding. The proposed use is permitted in a R4 one-family residential Zoning District, which provides for uses that serve the residents in the districts. The existing Aula (church) structure is proposed for removal as part of the site plan. At this time the property is not currently designated as historical, but is eligible.

At a HPC public hearing on November 5, 2018, the Commission voted that the former St. Andrew's church is eligible for local designation as a Saint Paul Heritage Preservation Site. The Planning Commission will provide a recommendation to the HPC at its December 14, 2018 meeting. The application is in progress with a final decision to be determined by the Saint Paul City Council.

If the former church becomes locally designated, any proposed alterations to the exterior of the building would need to be reviewed by the HPC. In the event of proposed demolition, the HPC could approve, approve with conditions, or deny the proposed demolition. Any such HPC decision would be subject to appeal to the City Council.

4. *Protection of adjacent and neighboring properties through reasonable provision for such matters as surface water drainage, sound and sight buffers, preservation of views, light and air, and those aspects of design which may have substantial effects on neighboring land uses.*

   The site plan meets this finding. The effect of this specific proposed building on neighboring properties is reasonable. Specific to the findings:
   - The stormwater system meets City standards for run-off rate control. The system will consist of pipes buried below grade located on the east side of the building in the proposed play area. In addition, roof drainage shall meet plumbing code requirements.
   - The building addition is oriented to the south side of the property towards the street frontage. The building's proposed setbacks meet or exceed the zoning requirement, providing a reasonable distance from the abutting homes.
   - The proposed site plan adheres to §63.110 – Building design standards, including delineation of a primary entrance, direct pedestrian connection to the street, building materials, minimum window and door openings, and reducing visual impact of rooftop equipment.
   - The setback area to the east is proposed to replace parking with a turf play area and coniferous trees along the street frontage. Existing boulevard trees will be protected where possible and new boulevard trees will be planted as required.
   - The east parking lot is currently screened with a wood fence along the alley. The fence shall be relocated within the property where it encroaches on the alley. This offers an opportunity to provide a more durable, opaque fence of sufficient height and density to visually separate the screened activity from adjacent property and to help improve the existing sound and sight buffer. Any fence will need to meet site triangle requirements for vehicles using the alley.
   - Off-street parking is proposed to increase from existing based on a Shared Parking Agreement with the adjacent church at 1040 Como Ave and additional bicycle parking. Refuse and recycling will continue in its existing location with alley pick-up.

5. *The arrangement of buildings, uses and facilities of the proposed development in order to assure abutting property and/or its occupants will not be unreasonably affected.*

   The site plan meets this finding. The existing use is a K – 8 school with 585 current student enrollment. The building addition will allow for classroom space for up to three sections per grade level (648 students). The total staff FTE is expected to increase from 80.5 to 86.5.

   As a buffer to abutting residential properties, the building addition is centered in the middle of the parcel with a 25' front setback and side yard setbacks of approximately 75' to the east and 80'+ to the west. Fencing along the east and landscaping along the southeast property lines will visually separate the building and play area from the abutting property.

6. *Creation of energy-conserving design through landscaping and location, orientation and elevation of structures.*

   The site plan meets this finding. A new building addition shall meet current building and energy codes. The building is oriented to the south corner of the site and exceeds the minimum amount of glazing on all sides, allowing the building to gain solar heat.

   The proposed development is located within two blocks minor arterial streets (Lexington Pkwy and Como Ave) with good public transit and off-street bicycle paths, and adjoining Van Slyke Ave is an enhanced bicycle route, making the area conducive to walking, biking, and using public transit rather than driving.

7. *Safety and convenience of both vehicular and pedestrian traffic both within the site and in relation to access streets, including traffic circulation features, the locations and design of entrances and exits and parking areas within the site.*

   The site plan can meet this finding. A Traffic Impact Study prepared by Spack Consulting with updates through 12/10/2018 is under review by Public Works Transportation and Safety. A condition of Site Plan approval should include acceptance of the Traffic Impact Study by the Public Works Transportation Planning and Safety Division.

   The site plan includes an existing surface parking lot with 25 spaces, proposed bike racks for at least 37 bicycles, and accessible sidewalks along Como Avenue. The proposed removal of an existing parking lot and curb cut on the east side of the building reduces potential pedestrian and vehicle conflicts on site. On-street parking is permitted on adjoining and nearby streets.

   The proposed development is located within two blocks minor arterial streets (Lexington Pkwy and Como Ave) with good public transit and off-street bicycle paths, and adjoining Van Slyke Ave is an enhanced bicycle route, making the area conducive to walking, biking, and using public transit rather than driving.

8. *The satisfactory availability and capacity of storm and sanitary sewers, including solutions to any drainage problems in the area of the development.*

   The site plan meets this finding. The utility connections are shown on Sheet C2. Water, Sanitary and Storm sewer services are available in Como Avenue.

   Stormwater from the building addition would be piped to an underground detention system located on the east of the property. There's an existing stormwater system under the west parking lot for run-off of the existing site. Stormwater would go out to the public storm sewer in Como Ave at a controlled rate that meets City standards. Drainage maps and HydroCAD modeling to meet the City's stormwater run-off rate control standards were reviewed and approved.

9. *Sufficient landscaping, fences, walls and parking necessary to meet the above objectives.*

   The site plan does not meet this finding as proposed. Conditions of Site Plan approval should include: 1) Approval of a variance for minimum off-street parking, 2) No net loss of off-street parking within the property, and 3) provide an obscuring fence along the east property line to buffer the proposed play area.

   The site plan does not meet the minimum off-street parking requirement based on one space per Full Time Equivalent employee (86 spaces required, 36 space deficiency). However, off-street parking is proposed to increase from existing based on a Shared Parking Agreement with

the adjacent church at 1040 Como Ave and additional bicycle parking. The site plan includes:

- 25 existing surface off-street vehicle parking spaces
- Removal of 7 off-street parking spaces
- One required bicycle parking space plus excess bicycle parking of 36 spaces, which allows for a 10% parking reduction
- Proposed shared parking for 15 off-street parking spaces with an adjacent church.

The setback areas to the southeast shall be landscaped and the east will be green space used for a play area and stormwater management. A fence exists along the east property line at the alley to visually separate the existing parking area from the abutting property; staff recommends the project provides a more durable, opaque fence of sufficient height and density to help improve the existing sound and sight buffer. Existing boulevard trees will be protected where possible and new boulevard trees planted as required.

10. *Site accessibility in accordance with the provisions of the Americans with Disabilities Act (ADA), including parking spaces, passenger loading zones and accessible routes.*

    The site plan meets this finding. The plan proposes one accessible parking space to meet the ADA standards required for lots up to 25 parking spaces. Required accessible entrances and routes shall be provided per accessibility code. The public sidewalks have accessible crossings.

11. *Provision for erosion and sediment control as specified in the ``Ramsey Erosion Sediment and Control Handbook."*

    The site plan meets this finding. The site plan includes an erosion and sediment control plan that meets this standard.

I. STAFF RECOMMENDATION:

Based on the findings above, the staff recommends approval of the site plan to allow a 3-story building addition to an existing school, play area and stormwater management at 1031 Como Ave. with the following conditions:

- Approval of variances for building height and lot coverage, or submittal of an updated site plan that meets Zoning Code density and dimensional standards.
- Approval of a variance for minimum off-street parking.
- No net loss of off-street parking within the property. A parking area to the replace the seven (7) off-street parking spaces proposed for removal shall be subject to Zoning Code standards and design and receive Zoning Administrator review and approval.
- Provide an obscuring wood fence at least 80% opaque and 6’ in height along the east property line to buffer the abutting properties.
- Acceptance of the Traffic Impact Study by the Public Works Transportation Planning and Safety Division.

CR # 1149
$945.00

City of Saint Paul Department of Safety & Inspections, 375 Jackson Street, Suite 220, Saint Paul MN 55101

SITE PLAN REVIEW APPLICATION

Date Application Received:

OCT 23 2018

Staff Use Only	
SPR File #	18-117556
Application Fee $	945.00
Staff Meeting Date:	11/13/18
City Agent:	AMS

Project Name:	TWIN CITIES GERMAN IMMERSION SCHOOL
Site Address: 1031 COMO AV.	Property Identification Number: 262923220173
Project Description:	23,500-SF BUILDING ADDITION TO THE EXISTING SCHOOL.

Provide (5) five Paper Copies 11x17 and an electronic PDF version (11x17 print format) of the complete Site Plan package including **certificate of survey, civil site plan, exterior architectural plan, and landscape plan.**

Project Summary

Est. Project Cost: $ 5-million *(exclusive of land value)*	Est. Construction Start UNDETERMINED	Proposed Land Use: ☐ Residential ☒ Institutional ☐ Parking Only ☐ Commercial ☐ Industrial ☐ Mixed-Use ☐ Other
Parcel Area *[sq. ft.]* 77,471	Disturbed Area *[sq. ft.]* 28,250	
~~Floor Area Ratio~~ LOT COVERAGE 39.1 %	Building Gross Floor Area 73,660	# Off-Street Parking Spaces 25
☐ Historic District/Property	☐ Flood Plain Property	☐ Steep Slope (>12%)

Residential Project Details

# Residential Units	# Affordable	% AMI for Affordable

Applicant Information [Name, company, address, phone, e-mail]

Developer or Property Owner	Project Contact [PM, architect]	Construction Contact
TWIN CITIES GERMAN IMM. IMMERSION SCHOOL TED ANDERSON 1031 COMO AVE, ST. PAUL MN 55103 651-492-7106 tanderson@tcgis.org	DEB RATHMAN, RIVERA ARCH. 651-222-3245, drathman.riverarchequestoffice.net BEN FORD, REHDER & ASSOC 651-337-6730, bford@rehder.com	ERIC OLSON, RJM CONST. 830 BOONE AV N. MINNEAPOLIS, MN 55427 952-698-8581 eric.olsen@rjmconstruction.com

Signature BENTON G. FORD

Date 10-23-18

Staff Use Only			
Zoning District R4	~~Overlay Zoning District~~		District Council 10-COMO
Ward 5	Watershed District CRWD		MnDOT or County Lexington
~~☐ Parkland Dedication~~	~~☐ TDMP~~	☐ CUP Required	~~Previous SPR~~

Existing Acreage: **.76 Acres**

Twin Cities German Immersion School – K-8 Charter School
1031 Como Ave. Saint Paul, MN

First Floor

Building Information

Existing: 9,800 @ 3 floors = 29,400 S.F.
2014 Addition: 20,670 S.F.
- First 7,135 s.f
- Second 6,400 s.f.
- Lower 7,135 s.f.

Phase II Gym/Classroom Addition: **23,590 S.F.**
- First 4,050 s.f
- Second 8,290 s.f.
- Lower 11,250 s.f.

Total Facility S.F. = **73,660 S.F.**

- Phase II classrooms
- Specialist classrooms
- Phase I classrooms
- Original Classrooms
- Small Group Classrooms
- Administrative/Support
- Gym./ Cafeteria/commons
- Service
- Circulation
- Future Expansion (potential)

Architects Inc .
Saint Paul,, MN
651.222.3245

Twin Cities German Immersion School – K-8 Charter School
1031 Como Ave. Saint Paul, MN

Second Floor

Building Information

Existing: 9,800 @ 3 floors =	29,400 S.F.
Phase I Addition:	20,670 S.F.
First 7,135 s.f	
Second 6,400 s.f.	
Lower 7,135 s.f.	
Phase II Gym/Classroom Addition:	**23,590 S.F.**
First 4,050 s.f	
Second 8,290 s.f.	
Lower 11,250 s.f.	
Total Facility S.F. =	**73,660 S.F.**

- Phase II classrooms
- Specialist classrooms
- Phase I classrooms
- Original Classrooms
- Small Group Classrooms
- Administrative/Support
- Gym./ Cafeteria/commons
- Service
- Circulation
- Future Expansion (potential)

Rivera Architects Inc.
Saint Paul,, MN
651.222.3245

Second Floor

Twin Cities German Immersion School – K-8 Charter School
1031 Como Ave. Saint Paul, MN

Lower Floor

Building Information

Existing: 9,800 @ 3 floors = 29,400 S.F.
Phase I Addition: 20,670 S.F.
First 7,135 s.f
Second 6,400 s.f.
Lower 7,135 s.f.

Phase II Gym/Classroom Addition: **23,590 S.F.**
First 4,050 s.f
Second 8,290 s.f.
Lower 11,250 s.f.

Total Facility S.F. = **73,660 S.F.**

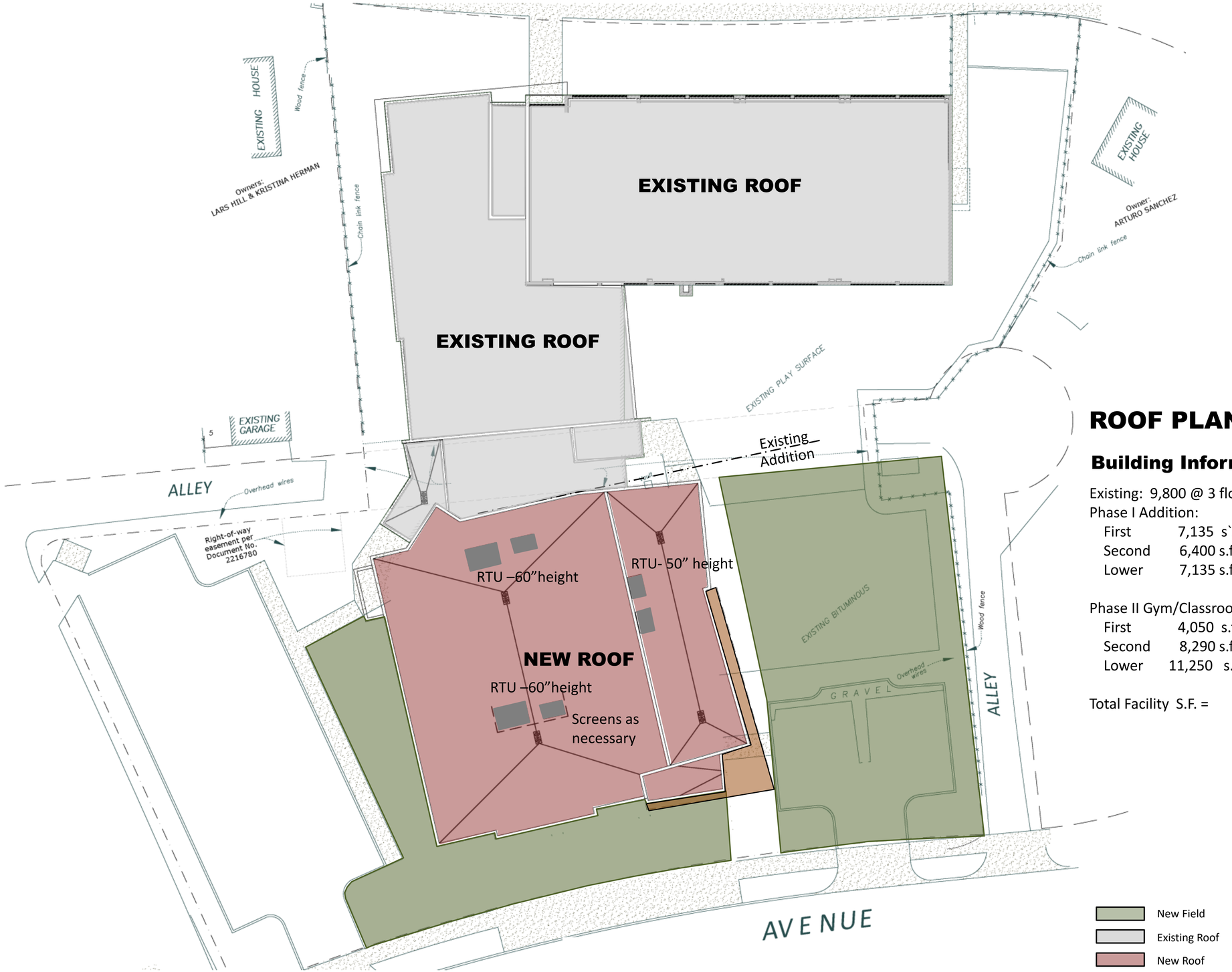
- Phase IiI classrooms
- Specialist classrooms
- Phase I classrooms
- Original Classrooms
- Small Group Classrooms
- Administrative/Support
- Gym./ Cafeteria/commons
- Service
- Circulation
- Future Expansion (potential)

Lower Floor

Twin Cities German Immersion School – K-8 Charter School

1031 Como Ave. Saint Paul, MN

Rivera Architects Inc.
651.222.3245



ROOF PLAN

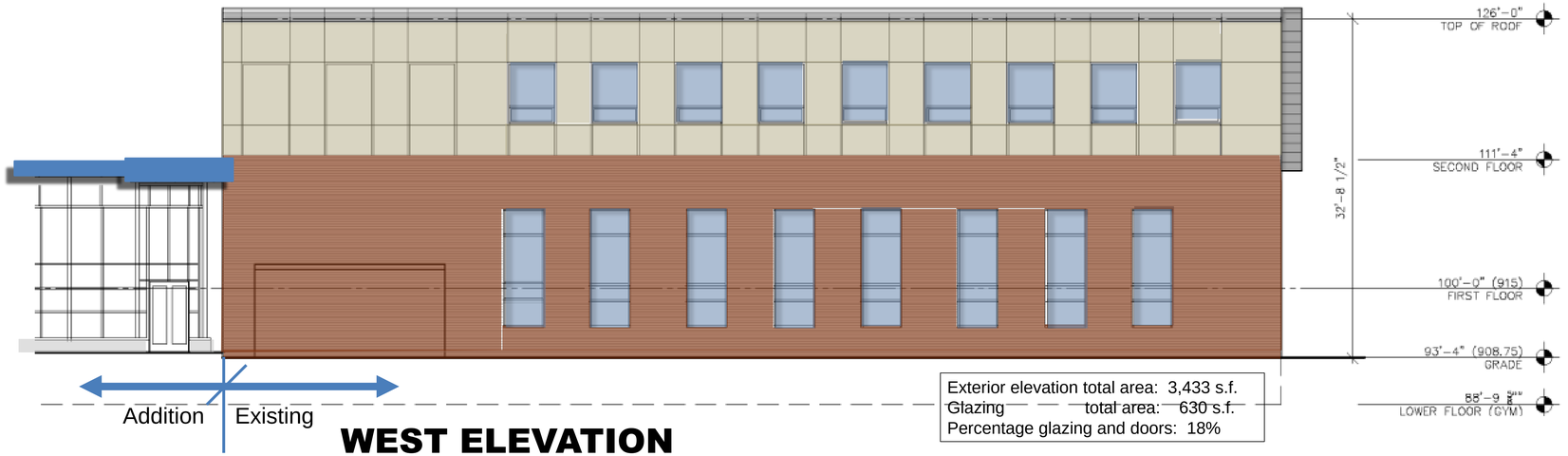
Building Information

Existing: 9,800 @ 3 floors =		29,400 S.F.
Phase I Addition:		20,670 S.F.
First	7,135 s`.f	
Second	6,400 s.f.	
Lower	7,135 s.f.	
Phase II Gym/Classroom Addition:		**23,590 S.F.**
First	4,050 s.f	
Second	8,290 s.f.	
Lower	11,250 s.f.	
Total Facility S.F. =		**73,660 S.F.**

New Field
Existing Roof
New Roof

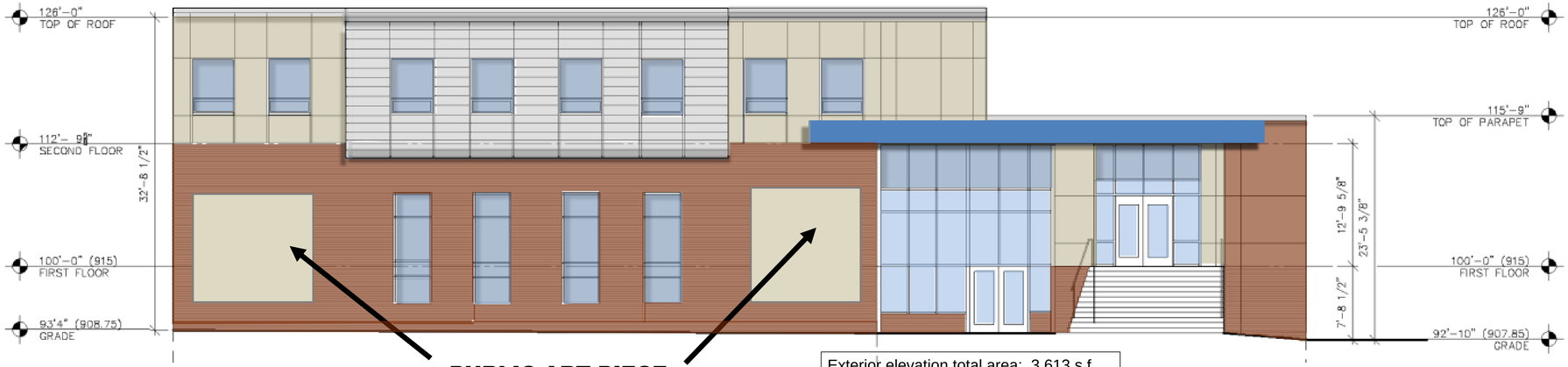
Rivera Architects Inc.
651.222.3245

ROOF PLAN
Twin Cities German Immersion School – K-8 Charter School
1031 Como Ave. Saint Paul, MN



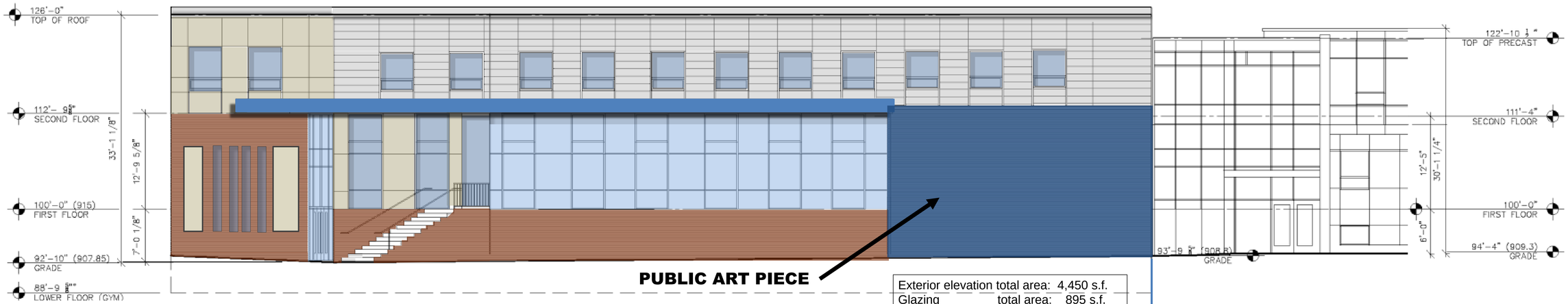
Exterior elevation total area: 3,433 s.f.
Glazing total area: 630 s.f.
Percentage glazing and doors: 18%

WEST ELEVATION



Exterior elevation total area: 3,613 s.f.
Glazing total area: 895 s.f.
Percentage glazing and doors: 24%

SOUTH ELEVATION



Exterior elevation total area: 4,450 s.f.
Glazing total area: 895 s.f.
Percentage glazing and doors: 24%

EAST ELEVATION

Rivera Architects Inc.
651.222.3245

Twin Cities German Immersion School – K-8 Charter School
1031 Como Ave. Saint Paul, MN

DEMOLITION NOTES

1 – Remove concrete pavement
2 – Remove building and canopies
3 – Remove light poles
4 – Remove concrete curb & gutter
5 – Remove bituminous pavement
6 – Remove sign
7 – Remove rain garden
8 – Relocate shed (coordinate with Owner)
9 – Remove concrete driveway apron and all base material under it.
10 – Remove fence and salvage for reuse.

NOTE: SEE ARCHITECTURAL FOR DEMOLITION OF EXISTING BUILDING

LEGEND

- BOUNDARY/ROW/BLOCK LINE
- EASEMENT
- BUILDING/PARKING SETBACK LINE
- SILT FENCE
- CONCRETE TO BE REMOVED
- EXISTING TREE TO BE REMOVED
- W — EXISTING WATERMAIN
- S — EXISTING SANITARY SEWER
- ST — EXISTING STORM SEWER
- G — EXISTING BURIED GAS LINE
- E — EXISTING BURIED ELECTRIC LINE
- C — EXISTING BURIED COMMUNICATION LINE

N

0 10 20 40 60
Scale in Feet

Rehder & Associates, Inc.
Civil Engineers, Planners and Land Surveyors
3440 Federal Drive, Suite 110 • Eagan, Minnesota 55122
651-452-5051 • Fax: 651-452-8797 • email: info@rehder.com

PROJECT NO.: 181-3062.011 DRAWING FILE: 3062011.DWG

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

PRELIMINARY

Name _____ Date _____ Reg. No. _____

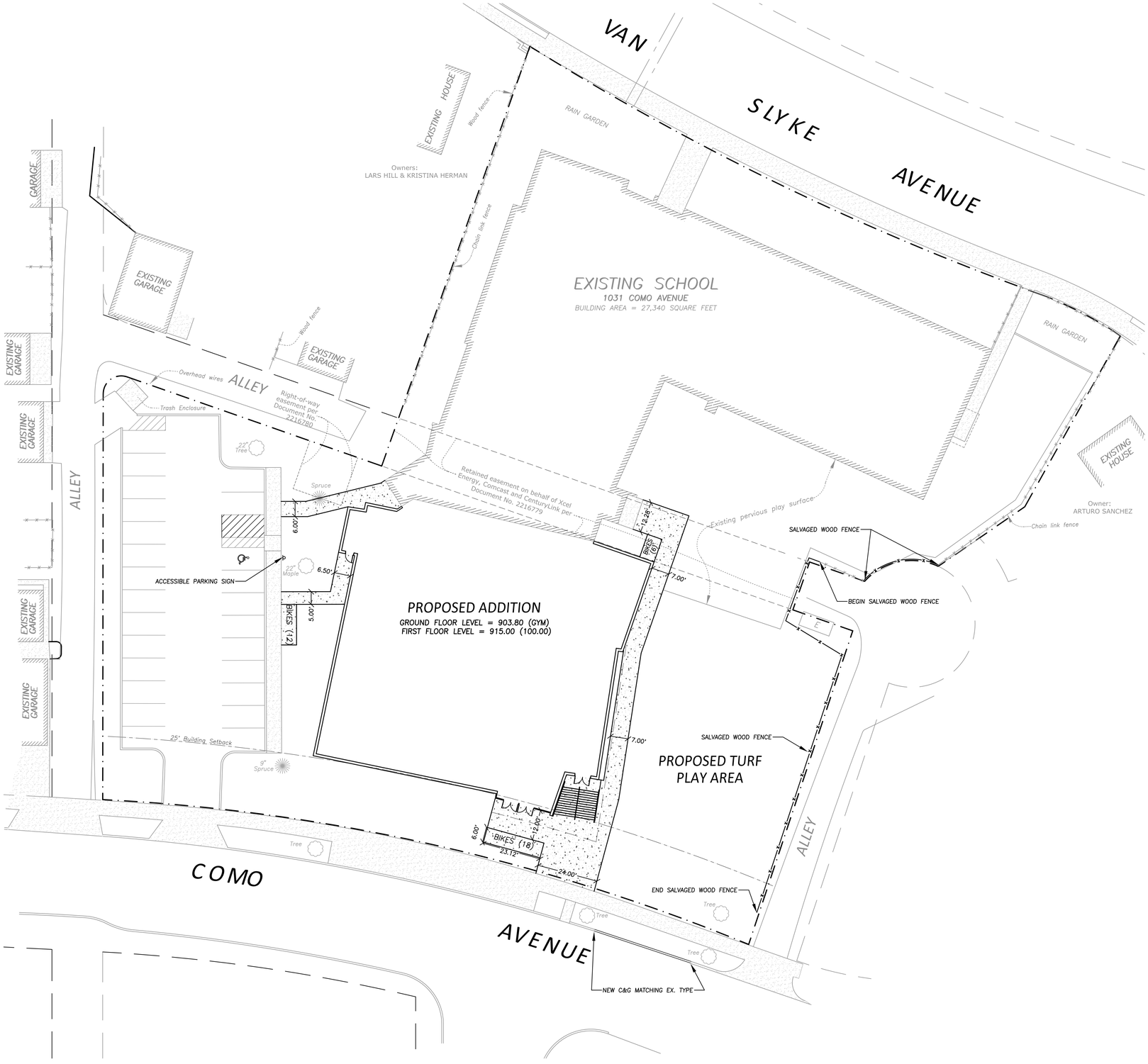
Issued

CITY SITE PLAN REVIEW	10-23-18
SPR RESUBMITTAL	11-26-18

SITE DEMOLITION PLAN
TWIN CITIES GERMAN IMMERSION SCHOOL
IMMERSION SCHOOL
CITY OF ST. PAUL

SHEET NUMBER

C0



SITE DATA

SITE AREA = 77,471
PRINCIPAL BUILDING COVERAGE = 30,290/77,471 = 39.1%
HARD SURFACE COVERAGE = 42,935/77,471 = 55.4%
(PERVIOUS PLAY SURFACE NOT INCLUDED)

PARKING STALLS REQUIRED

	FTE	STALLS
SCHOOL STAFF (FTE)	85	
TOTAL	85 X 1 STALL/FTE =	85

BICYCLE PARKING PROVIDED

TOTAL STALLS REQUIRED	85 STALLS
10% SUBSTITUTION	85 X 0.10 = 8.5 or 9 STALLS
4 BICYCLE SPACES PER STALL	9 X 4 = 36 BICYCLE SPACES REQUIRED
BICYCLE SPACES PROVIDED	36 BICYCLE SPACES PROVIDED

PARKING STALLS PROVIDED

STANDARD STALLS	ACCESSIBLE STALLS	COMPACT STALLS	BICYCLE PARKING	TOTAL
24	1	0	9	34

LEGEND

- PROPOSED CONCRETE
- W — EXISTING WATERMAIN
- S — EXISTING SANITARY SEWER
- ST — EXISTING STORM SEWER
- G — EXISTING BURIED GAS LINE
- E — EXISTING BURIED ELECTRIC LINE
- C — EXISTING BURIED COMMUNICATION LINE

N

0 10 20 40 60
Scale in Feet

Rehder & Associates, Inc.
Civil Engineers, Planners and Land Surveyors
3440 Federal Drive, Suite 110 • Eagan, Minnesota 55122
651-452-5051 • Fax: 651-452-8797 • email: info@rehder.com

PROJECT NO.: 181-3062.011 DRAWING FILE: 3062011.DWG

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

PRELIMINARY

Name _____ Date _____ Reg. No. _____

Issued

CITY SITE PLAN REVIEW	10-23-18
SPR RESUBMITTAL	11-29-18

SITE DIMENSION PLAN
TWIN CITIES GERMAN IMMERSION SCHOOL
IMMERSION SCHOOL
CITY OF ST. PAUL

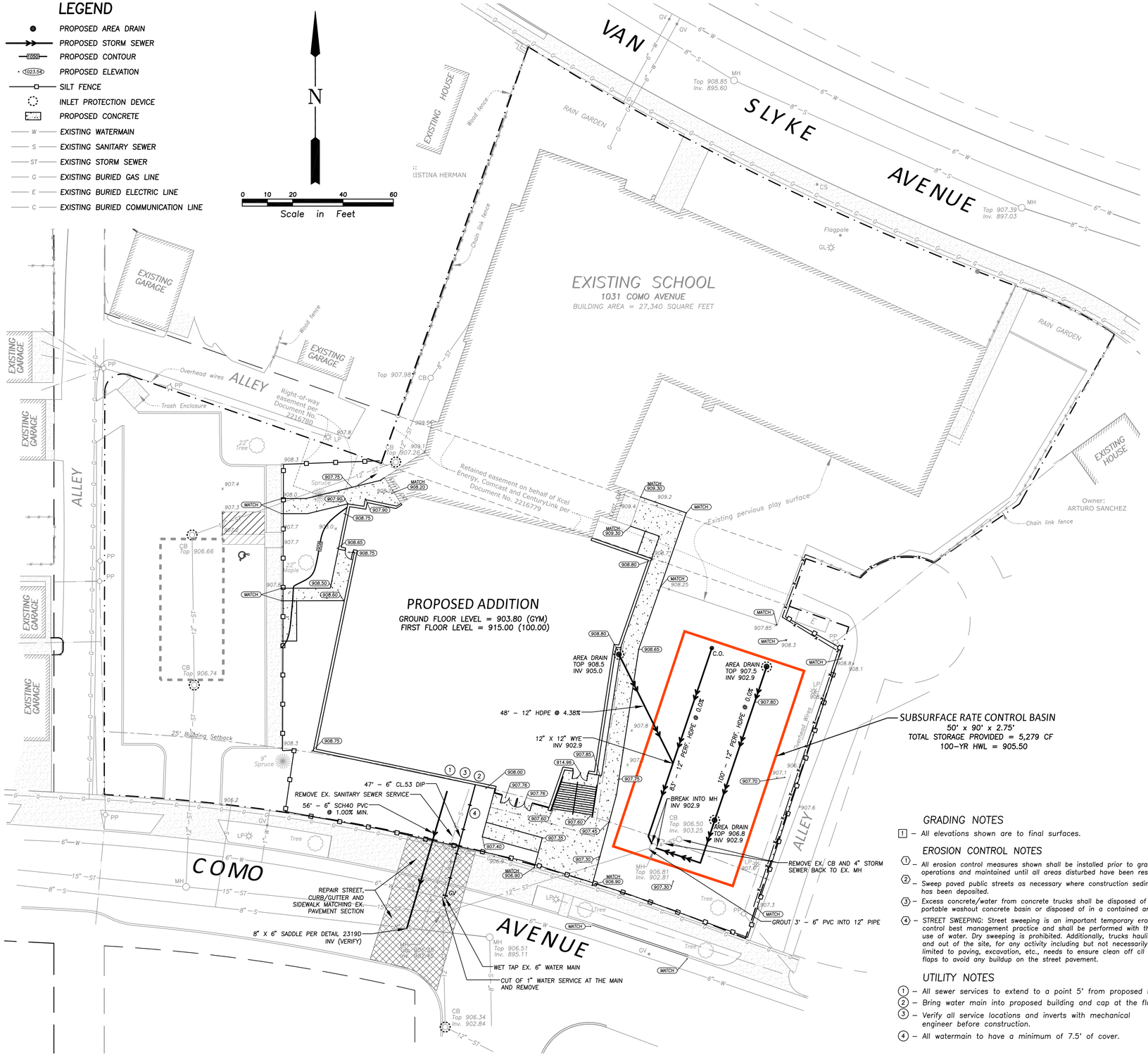
SHEET NUMBER
C1

LEGEND

- PROPOSED AREA DRAIN
- PROPOSED STORM SEWER
- PROPOSED CONTOUR (1020)
- PROPOSED ELEVATION (1023.54)
- SILT FENCE
- INLET PROTECTION DEVICE
- PROPOSED CONCRETE
- W — EXISTING WATERMAIN
- S — EXISTING SANITARY SEWER
- ST — EXISTING STORM SEWER
- G — EXISTING BURIED GAS LINE
- E — EXISTING BURIED ELECTRIC LINE
- C — EXISTING BURIED COMMUNICATION LINE

N

0 10 20 40 60
Scale in Feet



GRADING NOTES

[1] – All elevations shown are to final surfaces.

EROSION CONTROL NOTES

(1) – All erosion control measures shown shall be installed prior to grading operations and maintained until all areas disturbed have been restored.

(2) – Sweep paved public streets as necessary where construction sediment has been deposited.

(3) – Excess concrete/water from concrete trucks shall be disposed of in portable washout concrete basin or disposed of in a contained area.

(4) – STREET SWEEPING: Street sweeping is an important temporary erosion control best management practice and shall be performed with the use of water. Dry sweeping is prohibited. Additionally, trucks hauling in and out of the site, for any activity including but not necessarily limited to paving, excavation, etc., needs to ensure clean off all mud flaps to avoid any buildup on the street pavement.

UTILITY NOTES

(1) – All sewer services to extend to a point 5' from proposed building.

(2) – Bring water main into proposed building and cap at the floor.

(3) – Verify all service locations and inverts with mechanical engineer before construction.

(4) – All watermain to have a minimum of 7.5' of cover.

CITY OF ST. PAUL NOTES

GENERAL NOTES

1 – Construction supplies, materials, spoils, equipment, and vehicles shall not be stored or operated within the drip line of any public street tree or on turf boulevards without prior written approval from the City Forester. If the boulevard must be used for construction activities, site access routes, material storage or other related activities, protective measures approved by the City Forester shall be taken to reduce soil compaction and protect tree(s) from damage.

2 – Care must be taken during construction and excavation to protect any survey monuments and/or property irons. Call Sam Gibson of Public Works Surveying (651–266–6075) if you have any questions.

3 – MISCELLANEOUS: Any infrastructure damage resulting from the contractors activities, incidental or otherwise, shall be repaired/replaced to the satisfaction of the City at no cost to the City.

4 – Contractor to maintain access to the fire department connection for fire department personnel at all times during the construction period.

INSPECTION CONTACT:

5 – INSPECTION CONTACT: The developer shall contact the Right of Way inspector Dick Rohland at 651.485.1688 one week prior to beginning work to discuss traffic control, pedestrian safety, and coordination of all work in the public right of way. Note: If a one week notice is not provided to the City, any resulting delays shall be the sole responsibility of the Contractor. As part of the ROW permitting process, two weeks before any work begins that impacts the ROW in any way the developer shall provide to the ROW Inspector the name and contact information of the Construction Project Manager or Construction Project Superintendent. If this information is not provided there may be a delay in obtaining permits for the work in the ROW. Said delays will be the sole responsibility of the developer.

SAFE WORK REQUIREMENTS:

6 – The contractor shall provide a continuous, accessible and safe pedestrian walkway that meets ADA and MN MUTCD standards if working in a sidewalk area, and traffic control per MN MUTCD requirements for work in the public right of way.

7 – Please be advised that a Temporary Pedestrian Access Route (TPAR) and/or a Temporary Traffic Control (TTC) plan may be required as part of the Right–of–Way (ROW) permiting process. Said TTC or TPAR plans must be approved by the City prior to the ROW Permitting office issuing a permit(s).

NO PRIVATE FACILITIES IN THE RIGHT OF WAY:

8 – The developer is strictly prohibited from installing private electrical wiring, conduit, receptacles and/or lighting in the City's Right of Way. This includes stubbing conduit or cable into the public Right of Way to accommodate utility feeds to the site. Coordinate with each utility prior to construction to determine feed points into the property. Utilities are responsible for securing excavation permits to run their service into a site, and (where required) submitting plans for review by the Public Works Utility Review Committee. The Contractor shall contact Don Bjorkman, General Foreman, Lighting – Signal Maintenance, (651–266–9780), if removal or relocation of existing facilities is required or in the event of damage to the lighting or signal utilities. The Contractor shall assume responsibility (and related costs) for any damage or relocations. Access to signal controller and lighting cabinets must be maintained at all times. If fencing is required for a job site, a key or other means of access must be provided to the City of St. Paul's Traffic Operations Department. Contact Don Bjorkman, General Foreman Signals and Lighting at 651.266.9780 for more information.

CITY OF ST. PAUL PERMIT REQUIREMENTS:

9 – ORDERING OBSTRUCTION AND EXCAVATION PERMITS: Contact Public Works Right of Way Service Desk at (651) 266–6151. It is strongly recommended that contractors call for cost estimates prior to bidding to obtain accurate cost estimates,

10 – EXCAVATION PERMITS: All digging in the public right of way requires an Excavation Permit. If the proposed building is close to the right of way, and excavating into the right of way is needed to facilitate construction, contact the utility inspector.

11 – OBSTRUCTION PERMITS: The contractor must obtain an Obstruction Permit if construction (including silt fences) will block City streets, sidewalks or alleys, or if driving over curbs.

12 – FAILURE TO SECURE PERMITS: Failure to secure Obstruction Permits or Excavation Permits will result in a double–permit fee and other fees required under City of St. Paul Legislative Codes.

REQUIREMENTS TO WORK IN THE PUBLIC RIGHT OF WAY:

13 – All utilities and contractors must be registered, insured and bonded, as recognized by the Public Works Right of Way Service Desk, (651–266–6151) if they will be working in the public road right of way.

14 – CONSTRUCTION IN RIGHT OF WAY: All work on curbs, driveways, and sidewalks within the public right of way must be done to City Standards and Specifications by a contractor licensed to work in the City right–of–way under a permit from Public Works Sidewalk Section (651–266–6108). Sidewalk grades must be carried across driveways.

15 – RIGHT OF WAY RESTORATION: Restoration of asphalt and concrete pavements are performed by the Public Works Street Maintenance Division. The contractor is responsible for payment to the City for the cost of these restorations. The contractor shall contact Public Works Street Maintenance to set up a work order prior to beginning any removals in the street at (651–266–9700). Procedures and unit costs are found in Street Maintenance's "General Requirements – All Restorations" and are available at the permit office.

16 – The removal, pruning, and/or planting of trees on the public boulevard requires an approved permit from the City Forester (651–632–5129). Any work must be completed by a licensed tree contractor.

17 – Contractor shall contact City Forester, prior to demolition or other land disturbances associated with site construction, to verify tree protection is installed.

18 – Street trees shall be protected by establishing a tree protection zone using 4' tall fencing installed at the drip line of the tree. Tree protection fencing shall be installed prior to the start of any site work and maintained for the duration of the project. Proposed work within, or changes to the location of tree protection fencing shall be reviewed by the City Forester prior or alteration.

19 – ENCROACHMENTS: Per Chapter 134 of the Legislative Code, no person shall construct and maintain any projection or encroachment within the public right–of–way. Construction of the development that necessitates temporary use of the Right–of–Way (ROW) for construction purposes shall be limited to equipment, personnel, devices and appurtenances that are removable following construction. Encroachment permits will not be granted for devices such as tie backs, rock bolts, H–piles, lagging, timbers, sheet piling, etc. that the owner is seeking to abandon in the ROW. Section 3201.3 of the Minnesota Building Code defers final authority of encroachments into public right–of–way/public property to the local authority. City Legislative Code governs management of the public rights–of–way. Provided such installations are apppoved by Public Works, footings may be allowed to encroach into City ROW no more than twelve (12) inches at depths below eight (8) feet as provided for in Minnesota Building Code Section 3201.1. Said encroachments would require an encroachment permit from the City per Chapter 134 of the Legislative Code. Encroachments into County or State ROW are not allowed unless authorization has been granted from said agency. Encroachments installed in the ROW without authroization will be removed at no expense to the City/County/State.

20 – SIGNING: Signs regulating parking and/or traffic on private property shall be installed by the property owner or contractor outside of the public right–of–way (ROW). Removal of signs within the public ROW shall be completed by the City. New signs or the reinstallation of existing signs, as appproved by Public Works Traffic Engineering, regulating parking and/or traffic in the public ROW for this development shall be installed by the City at the expense of the development. Contact Chris Gulden of Public Works 651–266–9778 two weeks in advance of needed sign work.

21 – Contractor is responsible for damage to the mainline sidewalk, curb, drive access and boulevard landscaping cause during the construction. Contractor advised to document pre–existing condition of the right of way prior to commencement of the construction.

22 – ROADWAY RESTORATION: As per the City's "Standard Specification for Street Openings" policy, restoration on roadway surfaces less than 5 years old will require full width mill and overlay or additional degradation fees. Degradation fees are determined by contacting the Right of Way Service Desk at (651)–266–6151. Pavement restoration shall be completed by the St. Paul Public Works Street Maintenance Division. All related costs are the responsibility of the developer/contractor. Contact Street Maintenance at (651)–266–9700 for estimate of costs for pavement restoration.

BOULEVARD RESTORATION:

23 – Where driveways, sidewalks or other surface paving are removed, all concrete, asphalt and base materials shall be removed.

24 – Boulevard soils are to be protected during construction. Soil compaction due to construction activities shall be mitigated and soils loosened prior to final grading.

25 – All materials from rock construction entrances that cross turf boulevards shall be removed and soils restored, including the mitigation of soil compaction prior to final grading.

26 – Boulevards shall be restored with a minimum of 4" of topsoil.

27 – Concrete washouts shall not be located within the drip line of a tree.

MISCELLANEOUS NOTES:

28 – All primary roof drains shall be connected to the storm sewer. MPC 4714.1101.1.

29 – Secondary Roof Drainage shall drain to an approved place of disposal in the form Secondary Roof Drains installed per MPC 4714.1101 &1102, and Minnesota State Building Code 1503.4 1–5. Secondary roof drainage must discharge onto permeable soils and cannot drain onto the sidewalk. MPC 4714.1101.1. Both primary and secondary roof drainage systems must meet this requirement. Minnesota has specific requirements to address seasonal condition of freeze and thaw when the discharge from roof drains could create unsafe, icy conditions on sidewalk. A proper point of discharge that can be approved by the Authority Having Jurisdiction for secondary roof drainage is in the form of secondary roof drains piped internally, down to within 18 inches of grade, through the outside wall, onto a splash block installed per MPC 1101.5.3, and laid over permeable soils of an adequate amount where saturation of soil will not occur.

30 – SEWER REPAIR PERMIT: Plumbing Contractor to obtain "Repair Permits" from Public Works for proposed modification to existing storm sewer connections. Call St. Paul PW permit desk (651–266–6234) for information on obtaining this permit.

31 – SEWER REMOVAL/ABANDONMENT PERMIT for A53679: Plumbing Contractor to obtain "Removal Permits" from Public works to cut off existing sewer connections services to the property. Call St. Paul PW permit desk (651–266–6234) for information on obtaining this permit.

32 – A four–sided trench box is required on all excavation deeper than 5 feet where underground work or inspection is to performed by SPRWS. Ladders are required and must extend 3 feet above the surface of the trench. Sidewalks, pavements, ducts and appurtenant structures shall not be undermined unless a support system or another method of protection is provided. Trenches in excess of 20 feet in depth must be signed off by a registered professional engineer. Excavated material must be kept a minimum of 2 feet from the edge of the trench.

33 – All water service valve boxes within construction area must be exposed and brought to grade upon completion of construction.

34 – All pipe work inside of property to be performed by a plumber licensed by the State of Minnesota and Certified by the City of Saint Paul. SPRWS requires separate outside and inside plumbing permits for each new water service.

35 – Water facility pipework within right of way to be installed by SPRWS. Excavation and restoration by owner's contractor.

36 – The contractor providing excavation is responsible for obtaining all excavation and obstruction permits required by any governing authority.

36 – All unused water connections must be cutoff at the main. This work will be done by SPRWS. Excavation and restoration to be provided by the Contractor. Contractor to mill and overlay the entire width of the road at the bituminous patch location. The contractor providing excavation is responsible for obtaining all excavation and obstruction permits required by any governing authority.

Rehder & Associates, Inc.
Civil Engineers, Planners and Land Surveyors
3440 Federal Drive, Suite 110 • Eagan, Minnesota 55122
651-452-5051 • Fax: 651-452-8797 • email: info@rehder.com

PROJECT NO.: 181–3062.011 DRAWING FILE: 3062011.DWG

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name _____ Date _____ Reg. No. _____

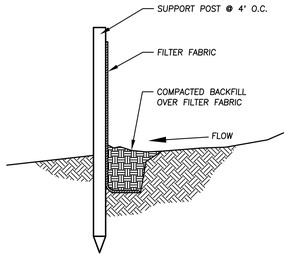
PRELIMINARY

Issued	
CITY SITE PLAN REVIEW	10–23–18
SPR RESUBMITTAL	11–29–18

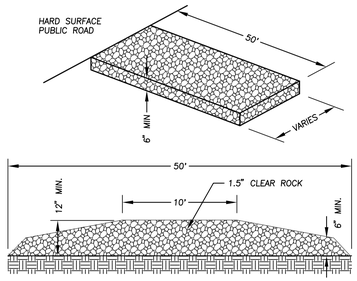
GRADING & EROSION CONTROL PLAN
TWIN CITIES GERMAN IMMERSION SCHOOL
IMMERSION SCHOOL
CITY OF ST. PAUL

SHEET NUMBER

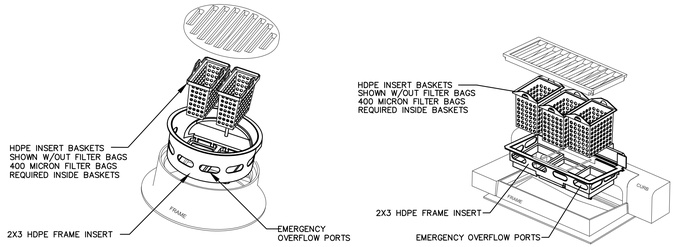
C2



1 / C3 — SILT FENCE
NO SCALE

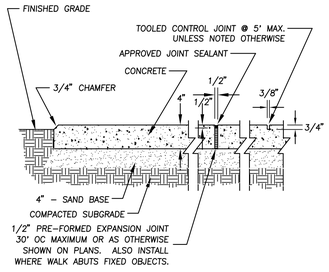


2 / C3 — ROCK CONSTRUCTION ENTRANCE
NO SCALE

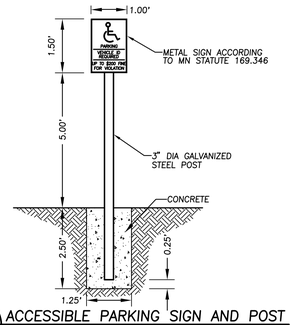


NOTE: USE THIS TYPE OF INLET PROTECTION AFTER THE CASTING IS INSTALLED.

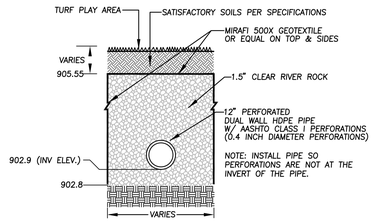
3 / C3 — INLET PROTECTION (INFRASAFE OR EQUAL)
NO SCALE



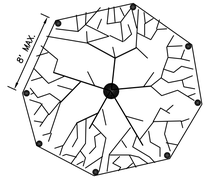
4 / C3 — CONCRETE SIDEWALK
NO SCALE



5 / C3 — ACCESSIBLE PARKING SIGN AND POST
NO SCALE

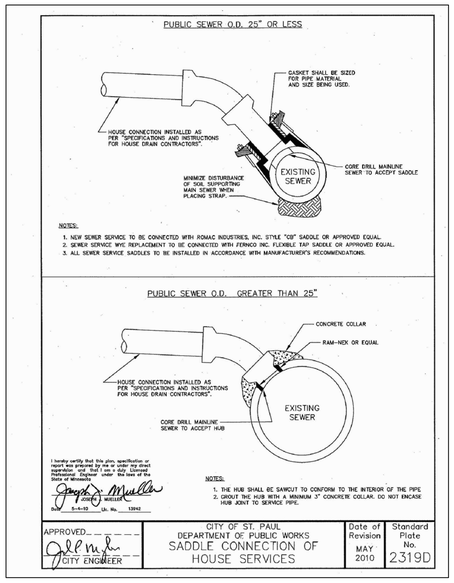


6 / C3 — SUBSURFACE RATE CONTROL BASIN CROSS SECTION
NO SCALE



4' SNOW FENCE WITH POST 8' ON CENTER TO BE PLACED AROUND TREE AT THE DRIP LINE OF THE OUTER MOST BRANCHES.

7 / C3 — TREE PROTECTION
NO SCALE



Rehder & Associates, Inc.
Civil Engineers, Planners and Land Surveyors
3440 Federal Drive, Suite 110 • Eagan, Minnesota 55122
651-452-5051 • Fax: 651-452-8797 • email: info@rehder.com

PROJECT NO.: 181-3062.011 DRAWING FILE: 3062011.DWG

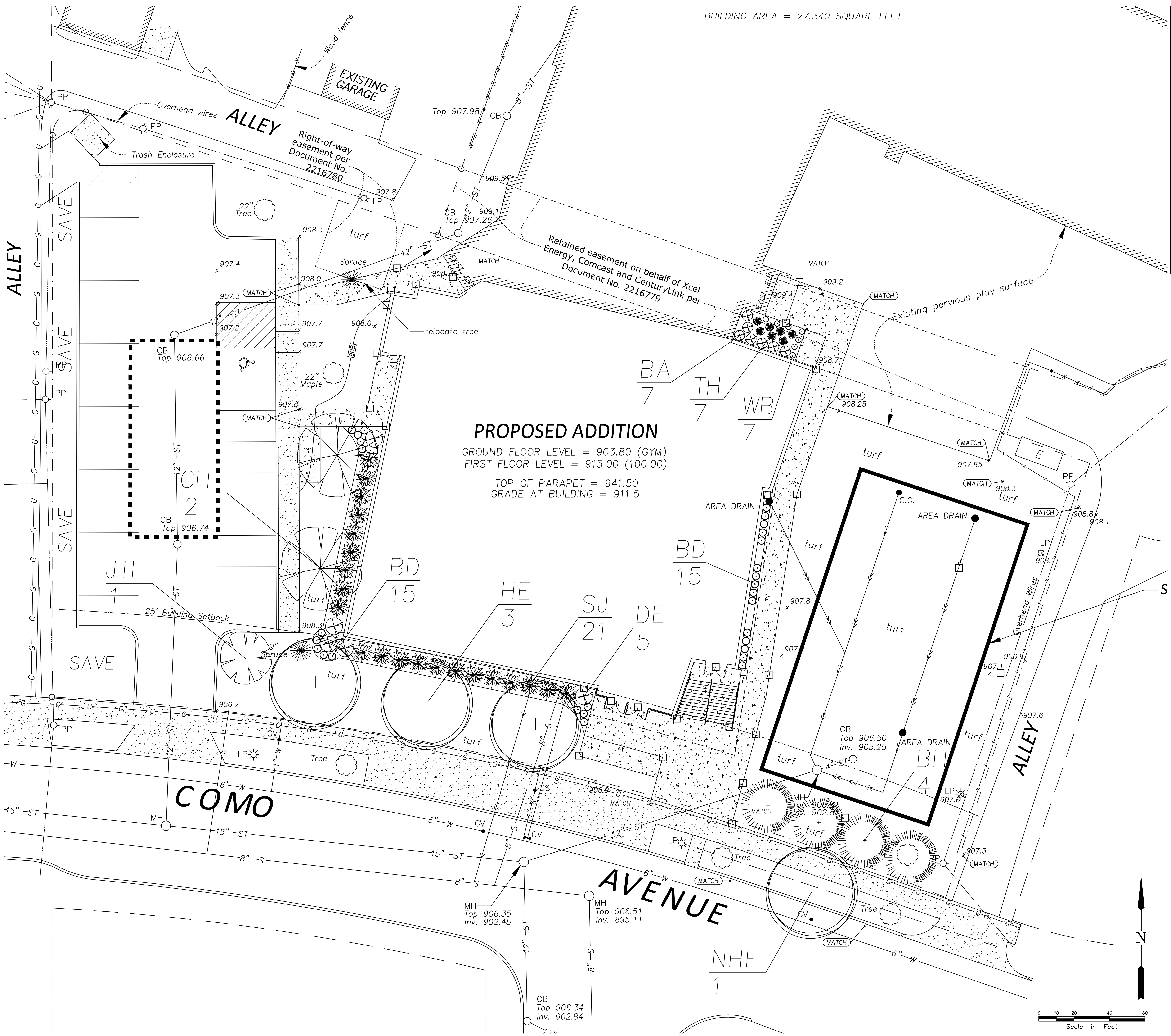
I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.
Name _____ Date _____ Reg. No. _____

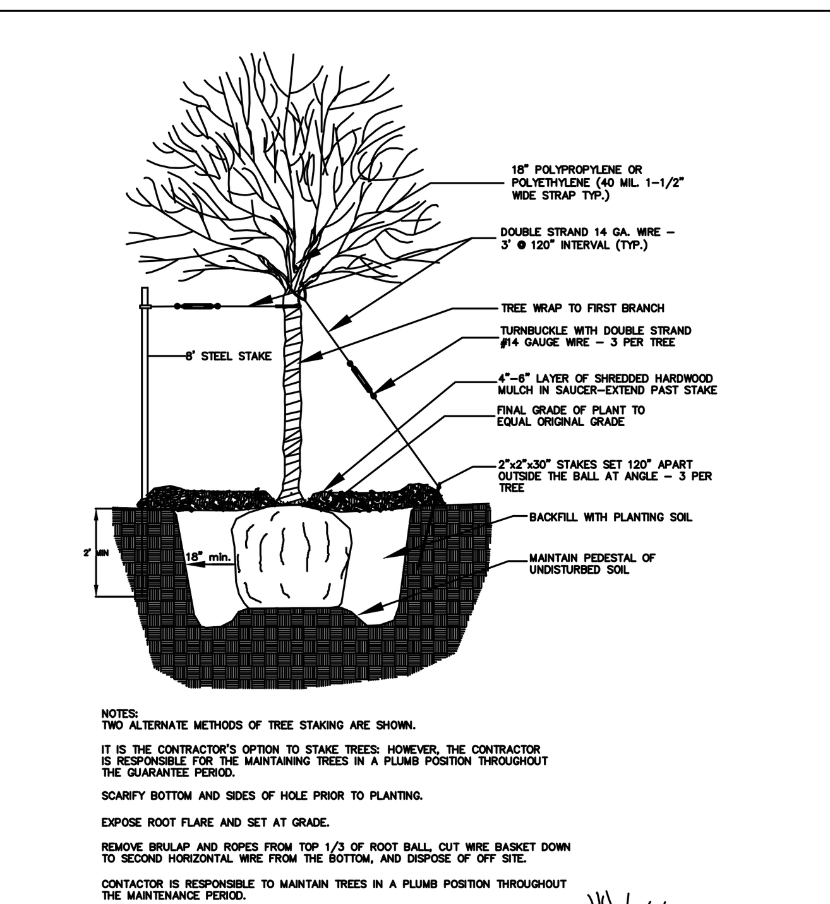
PRELIMINARY

Issued
CITY SITE PLAN REVIEW — 10-23-18
SPR RESUBMITTAL — 11-26-18

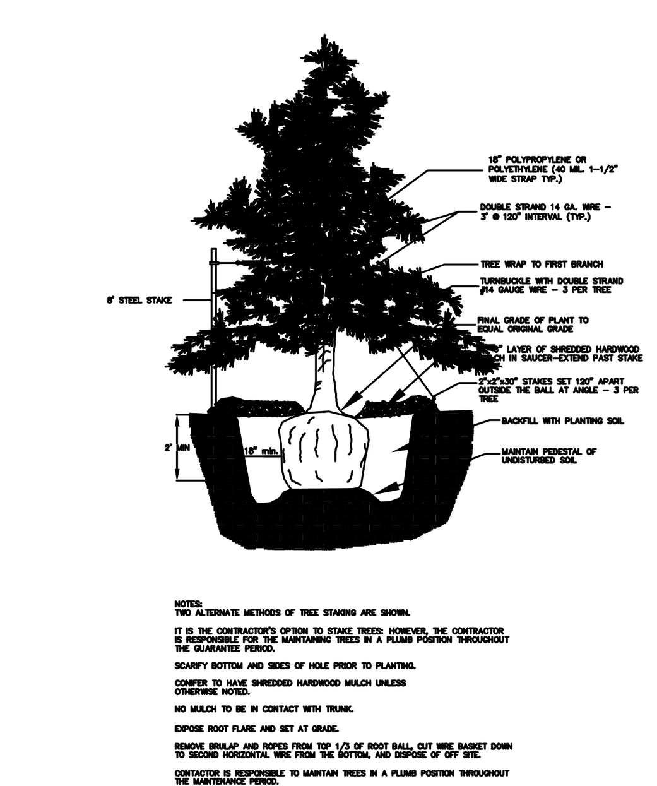
DETAILS & SPECIFICATIONS
TWIN CITIES GERMAN IMMERSION SCHOOL
IMMERSION SCHOOL
CITY OF ST. PAUL

SHEET NUMBER
C3

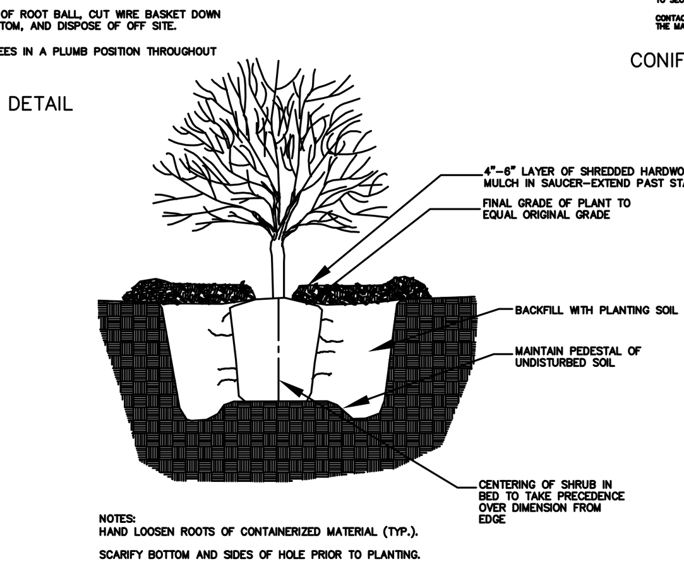




DECIDUOUS TREE PLANTING DETAIL



CONIFEROUS TREE PLANTING DETAIL



SHRUB PLANTING DETAIL

LANDSCAPE PLANTING SCHEDULE

QTY.	KEY	BOTANICAL NAME	COMMON NAME	SIZE/ROOT
TREES				
2	CH	Celtis occidentalis	Common Hackberry	2-1/2" B&B
3	HE	Ulmus 'Homestead'	Homestead Elm	2-1/2" B&B
1	NHE	Ulmus 'New Horizon'	New Horizon Elm	2-1/2" B&B
1	JTL	Syringa reticulata	Japanese Tree Lilac	1-1/2" B&B
4	BHS	Picea glauca densata	Black Hills Spruce	6' B&B
SHRUBS				
4	DE	Euonymus alatus 'Compacta'	Dwarf Winged Euonymus	5 Gal. Pot
4	GF	Spiraea x bumalda 'Goldflame'	Goldflame Spirea	5 Gal. Pot
8	SJ	Juniperus sabina 'Scandia'	Scandia Juniper	5 Gal. Pot
3	TY	Taxus x media 'Tauntonii'	Taunton Yew	5 Gal. Pot
PERENNIALS				
30	D	Hemerocallis 'Baja'	Baja Daylily	2 Gal. Pot
7	BA	Hosta 'Blue Angel.	Blue Angel	2 Gal. Pot
7	TH	Hosta 'Thunderbolt'	Thunderbolt	2 Gal. Pot
7	WB	Hosta 'Wide Brim'	Wide Brim	2 Gal. Pot

SOD & SEED

Sod shall be provided in the boulevard, around the building, and adjacent to curbed areas. Sod shall be drought tollerant Kentuckey blue grass Highland sod. No peat grown sod.

Seed mixture shall be selected by the Owner and approved by the City prior to installation in any areas disturbed by grading but not sodded. The approved seed selection shall be drought tolerant and require minimal maintenance. Seeding shall follow Seed Distributor's specific recommendations for applications and rates.

PLANTING NOTES:

Contractor shall verify locations with all utililies prior to installation of plants.

Contractor shall provide one year guarantee of all plant materials. The guarantee begins on the date of the Owner's final acceptance of the initial plantings. Replacement plant materials shall also have a one year guarantee commencing upon date of replacement planting.

The removal, and/or planting of trees on the public boulevard requires an approved permit from the City Forester (651-632-2437). Any work must be completed by a licensed tree contractor.

All plants to be northern-grown and hardy.

Plants to be installed as per standard AAN planting practices.

Use minimum 12" loam planting soil on trees and 6" on shrubs (sides and bottom).

All sod, shrub, and tree areas shall be irrigated with an in-ground irrigation system. Irrigation for seeded area to be temporary in nature pending future building expansion.

Staking of trees optional; reposition if not plumb after one year.

Wrap all smooth-barked trees-fasten top and bottom. Remove by April 1.

Open top of burlap on BB materials; remove pot on potted plants; split and break apart peat pots.

Prune plants as necessary - per standard nursery practice.

Owner shall be responsible for maintenance after acceptance of the work by the Owner.

Plants shall be immediately planted upon arrival at site. Properly heel-in materials if necessary, temporarily.

All disturbed areas to be sodded or seeded unless otherwise noted; sod to be standard Highland sod, hardy bluegrass mixture, and grown within 100 miles of this site.

Planting beds for shrubs shall have (4 oz. min.) weed barrier fabric, 4" of dark brown double shredded hardwood mulch and 4" vertical black commercial grade poly edging. No weed barrier shall be placed around ornamental grasses or perennial plants. Edging shall be set in straight smooth lines or curves as shown on the plan.

Dark brown double shredded hardwood mulch dish, 6' diameter, shall be used around all trees.

A weed preventative such as Preen shall be used on soils within planting beds prior to placement of mulch.

Placement of trees and/or shrubs may be adjusted slightly to avoid conflict areas or conditions such as utilities, sightlines, screening, snow removal areas, architectural features, or other unforeseen situations.

Street trees shall be protected by establishing a tree protection zone using 4 ft. tall fencing at the drip line of the tree. Tree protection fencing shall be installed prior to the start of any site work and maintained for the duration of the project. Proposed work within, or changes to the location of the tree protecting fencing shall be reviewed by the City Forester prior to alteration.

[redacted]
Civil Engineers, Planners and Land Surveyors
3440 Federal Drive, Suite 110 • Eagan, Minnesota 55122
651-452-5051 • Fax: 651-452-9797 • email: info@rehder.com

DATE	CHANGES
10-23-18	PRELIMINARY
12-04-18	CITY COMMENTS

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Licensed Landscape Architect under the laws of the State of Minnesota.

Name Debra Brodsho Date 10-23-18 Reg. No. 23849

BRODSHO CONSULTING
Landscape Architecture Site Planning
698 NORTHBRIDGE COURT
EAGAN, MN 55123
PHONE: 651-688-8023
dbrodsho@gmail.com

LANDSCAPE PLAN

GERMAN IMMERSION SCHOOL
CITY OF ST. PAUL, MN

SHEET NUMBER

L1

Survey for:

EDUCATIONAL PROPERTIES TCGIS, LLC

NOTES

* Bearings shown are based on the Ramsey County Coordinate System.
* Utilities shown are from information furnished by the City of St. Paul and Xcel Energy in response to Gopher State One Call Ticket Nos. 151973818 and are verified where possible.
* Contact Gopher State 1 for utility locations before any construction shall begin. Phone 651-454-0002.
* Area = 76,618 square feet (1.76 acres).
* Zoning: R-4.

PROPERTY DESCRIPTION TAKEN FROM OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY COMMITMENT FILE NO. 59001

Parcel 1:

Lots 10, 13, 14, 15, 20, 22 and 23, Block 4 in "Warrendale"; and that part of Lot 19, Block 4, "Warrendale", described as beginning at the most Northerly corner of said lot; thence Southwesterly, along the Northwesterly line of said lot, to the most Westerly corner of said lot; thence Easterly, along the Southwesterly line of said lot, to a point thereon 25 feet Southeasterly from, and as measured at right angles, to said Northwesterly line; thence Northeasterly 41.4 feet to the point 48.5 feet Southeasterly from, and as measured at right angles, to said Northwesterly line; thence Northeasterly to a point on the Northeasterly line of said lot distant 60 feet Southeasterly, as measured along said Northeasterly line, from the most Northerly corner of said lot; thence Northwesterly, along said Northeasterly line to the place of beginning, according to the recorded plat thereof, Ramsey County, Minnesota.

Being Registered land as is evidenced by Certificate of Title No. 228559.

Parcel 2:

Lots 11, 12 and 21, Block 4 "Warrendale", according to the recorded plat thereof, Ramsey County, Minnesota.

DESCRIPTION OF VACATED ALLEY PER DOCUMENT NO. 2216779

That part of the alley lying within Block 4, WARRENDALE, according to the recorded plat thereof, Ramsey County, Minnesota, dedicated in said plat of WARRENDALE, which lies easterly of the southerly extension of the west line of Lot 23, said Block 4 and westerly of the following described line:

Beginning at a point on the north line of Lot 15, said Block 4 distant 25.00 feet westerly of the northeast corner thereof; thence northerly, at right angles to the north line of said Lot 15, a distance of 20.00 feet to the south line of Lot 20, said Block 4 and there said line terminates.

LEGEND

- Iron Monument Found
- Iron Monument Set
- PK Nail Set
- S — Sanitary Sewer
- ST — Storm Sewer
- W — Watermain
- DT — Drain Tile
- Hyd. — Hydrant
- GV — Gate Valve
- CS — Curb Stop
- MH — Manhole
- CB — Catch Basin
- CO — Cleanout
- AD — Area Drain
- RD — Roof Drain
- Inv. — Invert Elevation
- Guard Post
- PP — Power Pole
- LP — Light Pole
- Concrete Surface
- Bituminous Surface
- Rubberized Play Surface
- G — Buried Gas
- E — Buried Electric
- GL — Ground Light
- GM — Gas Meter

N

0 10 20 40 60

Scale in Feet

UTILITY STATEMENT

The underground utilities shown have been located from field survey information and existing drawings. 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 shown are in the exact location indicated, although he does certify that they are shown as accurately as possible from information available. The surveyor has not physically located the underground utilities.

I hereby certify that this survey was prepared by me or under my direction and that I am a duly Licensed Land Surveyor under the laws of the State of Minnesota.

Dated this 3rd day of October, 2018

REHDER & ASSOCIATES, INC.

Gary C. Huber, Land Surveyor
Minnesota License No. 22036

Rehder and Associates, Inc.

CIVIL ENGINEERS AND LAND SURVEYORS

3440 Federal Drive • Suite 110 • Eagan, Minnesota • Phone (651) 452-5051

JOB: 154-2853.010

Rehder & Associates, Inc.
Civil Engineers, Planners & Land Surveyors

100-YR RATE CONTROL CALCULATIONS

FOR

TWIN CITIES GERMAN IMMERSION SCHOOL

10-23-18

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.

Report Prepared By:

Nicholas P. Adam, P.E.
Registration Number: 43856

Report Reviewed By:

Benton G. Ford, P.E.
Registration Number: 24392

Rehder & Associates, Inc.
Civil Engineers, Planners & Land Surveyors

3440 Federal Drive, Suite 110 · Eagan, Minnesota 55122
651-452-5051 · Fax: 651-452-9797 · Email: info@rehder.com

WORKSHEET

By: NPA Date: 10/23/2018
Checked by: Date:
Project No: Sheet of
Subject:

CITY OF ST. PAUL STORMWATER MANAGEMENT CALCULATIONS (100-YR)

Allowable Rate = 1.64 cfs/acre

Disturbed Site Area = 0.8 Acres (2013 PLAN)

100-YR Allowable Rate = 1.31 CFS (1.64 X 0.8)

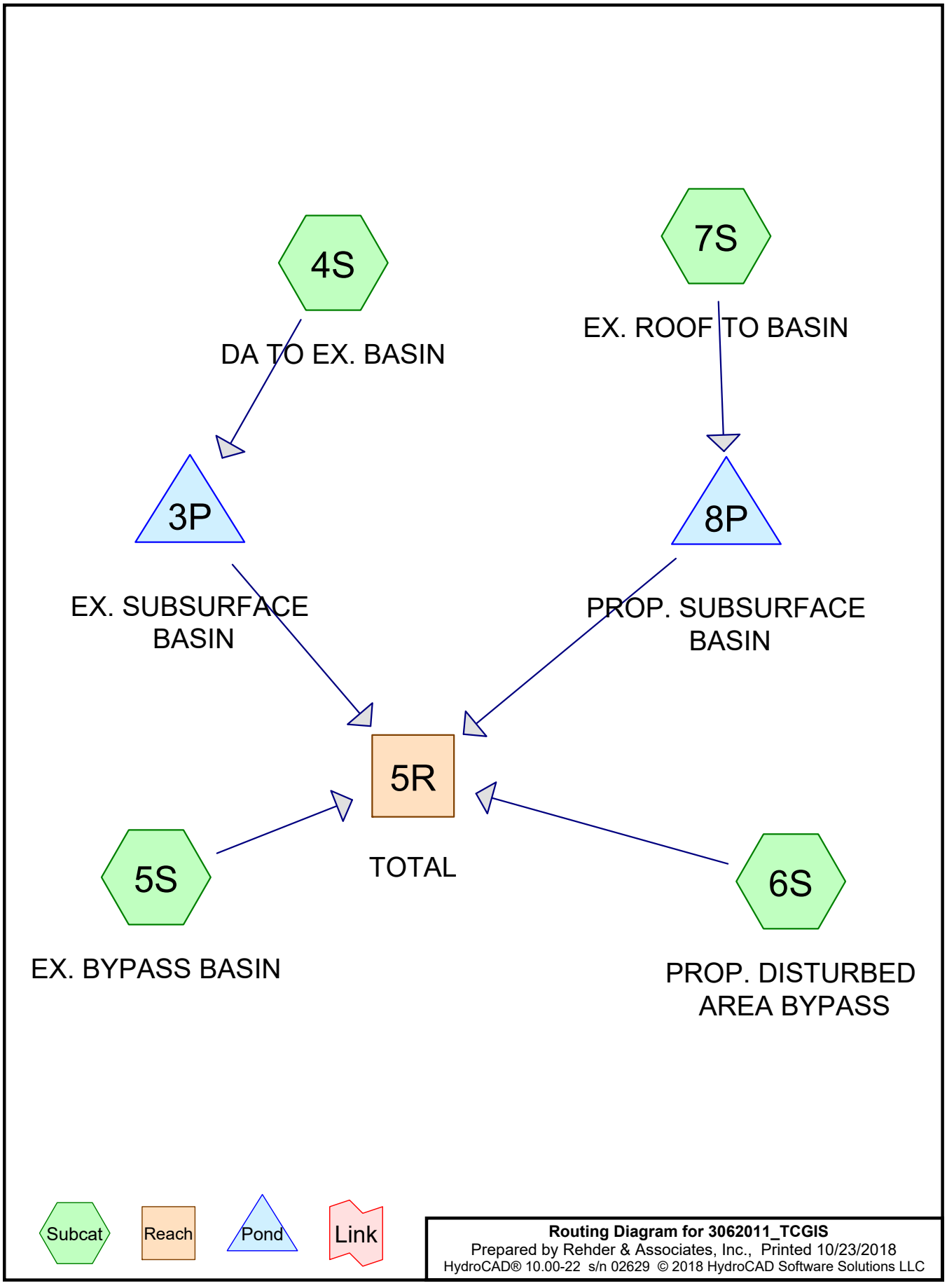
Disturbed Site Area = 0.56 Acres (2018 PLAN)

100-YR Allowable Rate = 0.92 CFS (1.64 X 0.8)

Allowable Rate From Ex. Roof Area = 0.75 CFS

Total Allowable Rate = 2.98 CFS (1.31 + 0.92 + 0.75)

Proposed Rate = 2.8 CFS (see Hydrocad Report)



Routing Diagram for 3062011_TCGIS
Prepared by Rehder & Associates, Inc., Printed 10/23/2018

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Pond 3P: EX. SUBSURFACE BASIN Peak Elev=906.67' Storage=3,848 cf Inflow=3.69 cfs 0.212 af
Discarded=0.11 cfs 0.084 af Primary=1.14 cfs 0.128 af Outflow=1.26 cfs 0.212 af

Subcatchment 4S: DA TO EX. BASIN Runoff Area=0.550 ac 72.73% Impervious Runoff Depth=4.63"
Tc=10.0 min CN=88 Runoff=3.69 cfs 0.212 af

Reach 5R: TOTAL Inflow=2.77 cfs 0.454 af
Outflow=2.77 cfs 0.454 af

Subcatchment 5S: EX. BYPASS BASIN Runoff Area=0.110 ac 27.27% Impervious Runoff Depth=2.90"
Tc=5.0 min CN=71 Runoff=0.59 cfs 0.027 af

Subcatchment 6S: PROP. DISTURBED Runoff Area=0.080 ac 25.00% Impervious Runoff Depth=2.81"
Tc=5.0 min CN=70 Runoff=0.41 cfs 0.019 af

Subcatchment 7S: EX. ROOF TO BASIN Runoff Area=0.100 ac 100.00% Impervious Runoff Depth=5.76"
Tc=10.0 min CN=98 Runoff=0.75 cfs 0.048 af

Pond 8P: PROP. SUBSURFACE BASIN Peak Elev=905.55' Storage=5,271 cf Inflow=4.83 cfs 0.281 af
Outflow=1.00 cfs 0.281 af

Summary for Pond 3P: EX. SUBSURFACE BASIN

Inflow Area = 0.550 ac, 72.73% Impervious, Inflow Depth = 4.63" for 100 Year event
Inflow = 3.69 cfs @ 12.17 hrs, Volume= 0.212 af
Outflow = 1.26 cfs @ 12.40 hrs, Volume= 0.212 af, Atten= 66%, Lag= 13.6 min
Discarded = 0.11 cfs @ 12.40 hrs, Volume= 0.084 af
Primary = 1.14 cfs @ 12.40 hrs, Volume= 0.128 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 906.67' @ 12.40 hrs Surf.Area= 8,270 sf Storage= 3,848 cf

Plug-Flow detention time= 285.2 min calculated for 0.212 af (100% of inflow)
Center-of-Mass det. time= 284.1 min (1,065.9 - 781.8)

Volume	Invert	Avail.Storage	Storage Description
#1	899.65'	1,662 cf	**25.00'W x 56.00'L x 3.00'H ROCK STORAGE** 4,200 cf Overall - 44 cf Embedded = 4,156 cf x 40.0% Voids
#2	902.65'	560 cf	**25.00'W x 56.00'L x 1.00'H ROCK STORAGE** 1,400 cf Overall x 40.0% Voids
#3	901.65'	44 cf	**12.0" Round 18" PERF. PIPE** Inside #1 L= 56.0'
#4	901.65'	55 cf	**4.00'D x 4.35'H CB**
#5	901.65'	55 cf	**4.00'D x 4.35'H CB**
#6	906.00'	1,966 cf	**PONDING ON THE LOT (Irregular)** Listed below (Recalc)
		4,341 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
906.00	40	40.0	0	0	40
906.45	3,220	305.0	543	543	7,316
906.75	6,450	350.0	1,423	1,966	9,663

Device	Routing	Invert	Outlet Devices
#1	Primary	902.65'	**4.0" Vert. Orifice** C= 0.830
#2	Discarded	899.65'	**0.600 in/hr Infiltration over Surface area**

Discarded OutFlow Max=0.11 cfs @ 12.40 hrs HW=906.67' (Free Discharge)
↑└**2=Infiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=1.14 cfs @ 12.40 hrs HW=906.67' (Free Discharge)
↑└**1=Orifice** (Orifice Controls 1.14 cfs @ 13.07 fps)

Summary for Subcatchment 4S: DA TO EX. BASIN

Runoff = 3.69 cfs @ 12.17 hrs, Volume= 0.212 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100 Year Rainfall=6.00"

	Area (ac)	CN	Description
*	0.400	98	Impervious
	0.150	61	>75% Grass cover, Good, HSG B
	0.550	88	Weighted Average
	0.150		27.27% Pervious Area
	0.400		72.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Reach 5R: TOTAL

Inflow Area = 1.460 ac, 67.81% Impervious, Inflow Depth = 3.73" for 100 Year event
Inflow = 2.77 cfs @ 12.14 hrs, Volume= 0.454 af
Outflow = 2.77 cfs @ 12.14 hrs, Volume= 0.454 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 5S: EX. BYPASS BASIN

Runoff = 0.59 cfs @ 12.12 hrs, Volume= 0.027 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100 Year Rainfall=6.00"

	Area (ac)	CN	Description
*	0.030	98	Impervious
*	0.080	61	>75% Grass cover, Good, HSG B
	0.110	71	Weighted Average
	0.080		72.73% Pervious Area
	0.030		27.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 6S: PROP. DISTURBED AREA BYPASS

Runoff = 0.41 cfs @ 12.12 hrs, Volume= 0.019 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100 Year Rainfall=6.00"

	Area (ac)	CN	Description
*	0.020	98	Impervious
*	0.060	61	>75% Grass cover, Good, HSG B
	0.080	70	Weighted Average
	0.060		75.00% Pervious Area
	0.020		25.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 7S: EX. ROOF TO BASIN

Runoff = 0.75 cfs @ 12.17 hrs, Volume= 0.048 af, Depth= 5.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100 Year Rainfall=6.00"

	Area (ac)	CN	Description
*	0.100	98	Impervious
	0.100		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Pond 8P: PROP. SUBSURFACE BASIN

Inflow Area = 0.720 ac, 75.00% Impervious, Inflow Depth = 4.69" for 100 Year event
Inflow = 4.83 cfs @ 12.17 hrs, Volume= 0.281 af
Outflow = 1.00 cfs @ 12.53 hrs, Volume= 0.281 af, Atten= 79%, Lag= 21.4 min
Primary = 1.00 cfs @ 12.53 hrs, Volume= 0.281 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 905.55' @ 12.53 hrs Surf.Area= 4,750 sf Storage= 5,271 cf

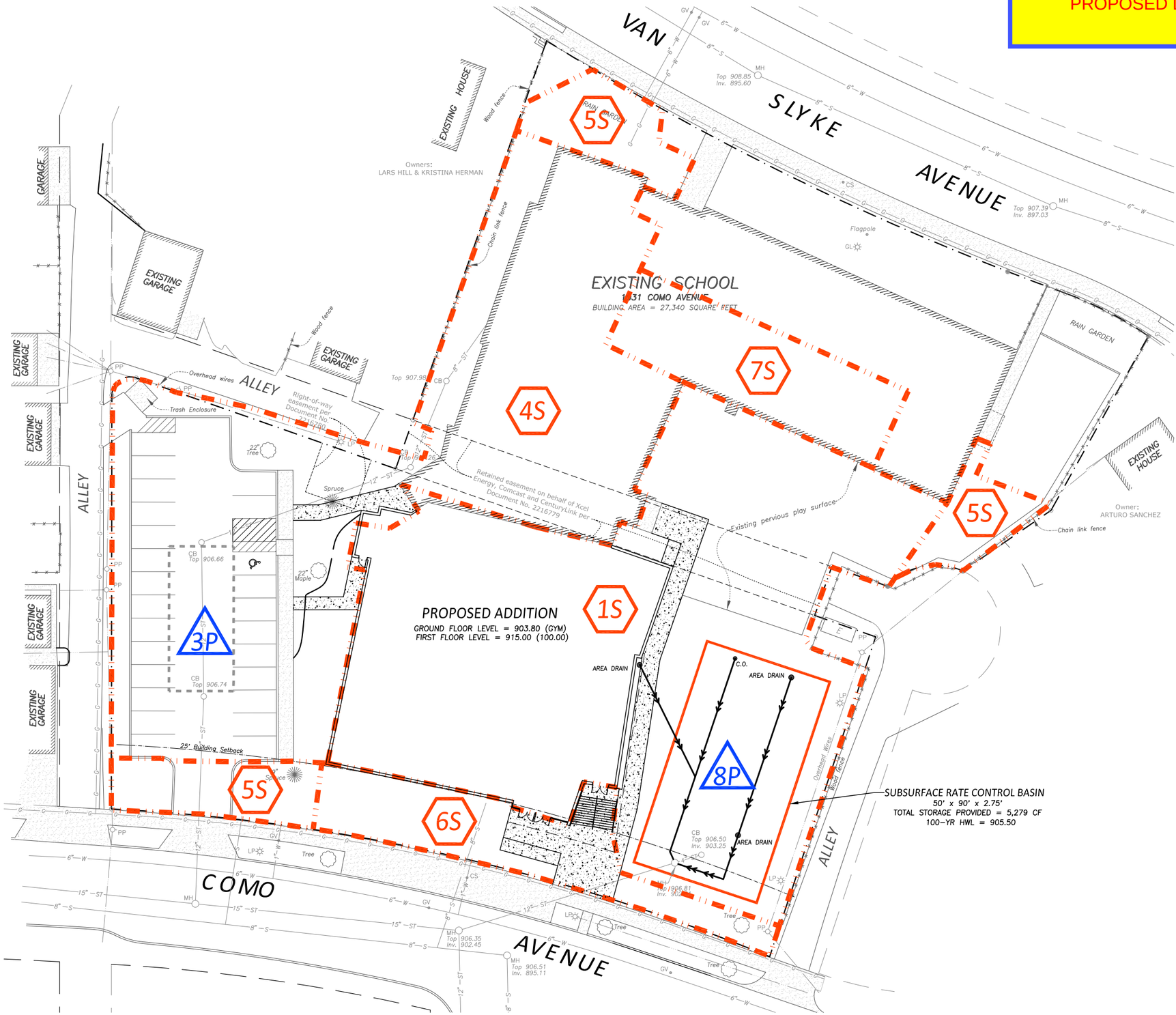
Plug-Flow detention time= 78.7 min calculated for 0.281 af (100% of inflow)
Center-of-Mass det. time= 78.0 min (855.6 - 777.7)

Volume	Invert	Avail.Storage	Storage Description
#1	902.80'	5,161 cf	**50.00'W x 95.00'L x 2.75'H Subsurface Storage** 13,063 cf Overall - 160 cf Embedded = 12,902 cf x 40.0% Voids
#2	902.90'	59 cf	**12.0" Round Pipe Storage** Inside #1 L= 75.0' 80 cf Overall - 1.0" Wall Thickness = 59 cf
#3	902.90'	59 cf	**12.0" Round Pipe Storage** Inside #1 L= 75.0' 80 cf Overall - 1.0" Wall Thickness = 59 cf
		5,279 cf	Total Available Storage

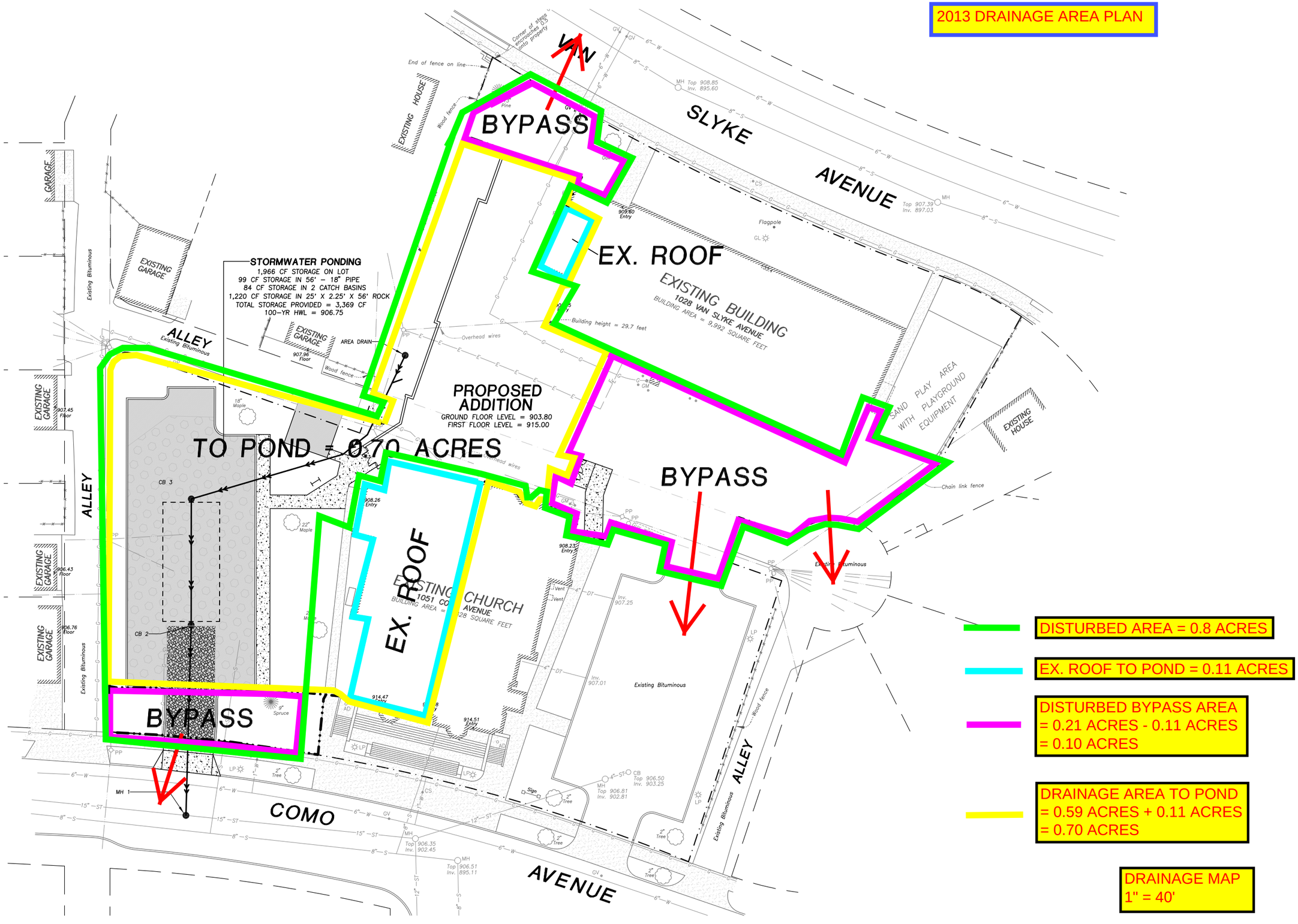
Device	Routing	Invert	Outlet Devices
#1	Primary	902.80'	**6.0" Vert. Orifice** C= 0.400

Primary OutFlow Max=1.00 cfs @ 12.53 hrs HW=905.54' (Free Discharge)
1=Orifice (Orifice Controls 1.00 cfs @ 5.07 fps)

PROPOSED DRAINAGE AREA PLAN
1' = 40'



2013 DRAINAGE AREA PLAN



DISTURBED AREA = 0.8 ACRES

EX. ROOF TO POND = 0.11 ACRES

DISTURBED BYPASS AREA = 0.21 ACRES - 0.11 ACRES = 0.10 ACRES

DRAINAGE AREA TO POND = 0.59 ACRES + 0.11 ACRES = 0.70 ACRES

DRAINAGE MAP
1" = 40'

Spack CONSULTING
ENGINEERING TRAFFIC FORWARD

Traffic Impact Study

TWIN CITIES GERMAN IMMERSION SCHOOL

SAINT PAUL, MINNESOTA

I hereby certify this report was prepared by me or under my direct supervision, and I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

By: _____
Bryant J. Ficek, PE, PTOE
MN Lic. No. 42802

Date: December 10, 2018

Executive Summary

Background:

The Twin Cities German Immersion School (TCGIS) is proposing building renovations to update their facilities and accommodate expected student growth. The purpose of this study is to review the traffic operations around the TCGIS site now and with the proposed renovations and recommend and improvements that are needed with the goal of improving operations and safety around the site.

Results:

The principal findings of this study are:

- The study intersections currently operate acceptably in all three peak hours in the existing and year 2023 scenarios with the exception of the Lexington Parkway & Wynne Avenue/Como Avenue intersection in the a.m. and school p.m. peak hours in the existing and year 2023 scenarios.
- None of the study intersections have a crash issue based on the latest three years of available crash data.
- Traffic is expected to increase both from expansion of the school's population and generic growth the area.
- Parking demands from the TCGIS can be accommodated on-street on the surrounding roadways.
- Current issues around the TCGIS during the pick-up/drop-off times include large amounts vehicle stacking at the school building, vehicle stacking on westbound Como Avenue at Lexington Parkway, large number of pedestrian crossings at multiple locations on Como Avenue, and a general mixing of pedestrians, buses, moving cars, parked cars and pick-up/drop-off cars.
- With the recommended alternatives in place, the Lexington Parkway & Wynne Avenue/Como Avenue intersection is forecast to operate acceptably in all peak hours in the year 2023.

Recommendations:

The following items are recommended based on the analyses contained in this study:

- Add a marked pedestrian crossing on Como Avenue on the west side of the intersection with Oxford Street. Everyone going to/from the TCGIS needing to cross Como Avenue should be directed to this crossing. Crossing guards should be utilized before and after school as needed.
- Implement staggered release times for the end of the school day with 15 minutes between each half of the school being released.
- Modify the weekday school year signal timing between approximately 8:00 and 8:15 a.m. at the Lexington Parkway & Wynne Avenue/Como Avenue intersection to accommodate more green time for the westbound approach. Similarly, modify the signal timing between approximately 3:15 and 3:30 p.m. unless staggered release times are implemented at the TCGIS.
- Instruct staff of the TCGIS to not park on-street at either of the following two locations:
    - The north side of Como Avenue between Churchill Street and Van Slyke Avenue.
    - The south side of Como Avenue between the alley west of Oxford Street and Argyle Street.
- Extend the time-of-day parking restrictions on the north side of Como Avenue from in front of the TCGIS building to the Van Slyke Avenue intersection.
- The City of Saint Paul consider and close off the Van Slyke Triangle.

TABLE OF CONTENTS

LIST OF TABLES, CHARTS & FIGURES

1. Introduction

a. Purpose of Study

The Twin Cities German Immersion School (TCGIS) is proposing building renovations to update their facilities and accommodate expected student growth. The purpose of this study is to review the traffic operations around the TCGIS site, both existing and with the proposed renovations, and recommend improvements that are needed with the goal of improving operations and safety around the site. For those not familiar with the general concepts and terms associated with traffic engineering, *The Language of Traffic Engineering* guide is included in the Appendix.

Spack Consulting completed an "Existing Conditions" memorandum for the TCGIS in November 2018. That document is referenced in this report and is included for review in the Appendix.

b. Study Objectives

The objectives of this study are:

- Review how the study intersections and roadways currently operate.
- Forecast the amount of traffic expected to be generated in the future by the school as well as non-school traffic.
- Determine the parking needs for the site based on City code and compare that to the surrounding availability.
- Recommend short-term and long-term improvements, if applicable, that can be made to the school's traffic operations.

For the purposes of this traffic study, the intersections closest to the proposed development and where the greatest impact is expected were chosen for initial review and include:

1. Lexington Parkway & Como Avenue/Horton Avenue
2. Horton Avenue & Van Slyke Avenue
3. Van Slyke Avenue & Churchill Street
4. Como Avenue & Chatsworth Street
5. Lexington Parkway & Wynne Avenue/Como Avenue
6. Churchill Street & Como Avenue
7. Como Avenue & West Parking Lot
8. Como Avenue & Oxford Street
9. Como Avenue & East Parking Lot

It should be noted traffic expected from the proposed development will have minor impacts on other intersections beyond those studied here. Furthermore, this study does not account for the existing roadway conditions such as pavement quality or appropriate drainage.

2. Existing Conditions Summary

As mentioned, Spack Consulting previously completed an Existing Conditions memorandum, which can be referenced in the Appendix for further details about the existing network.

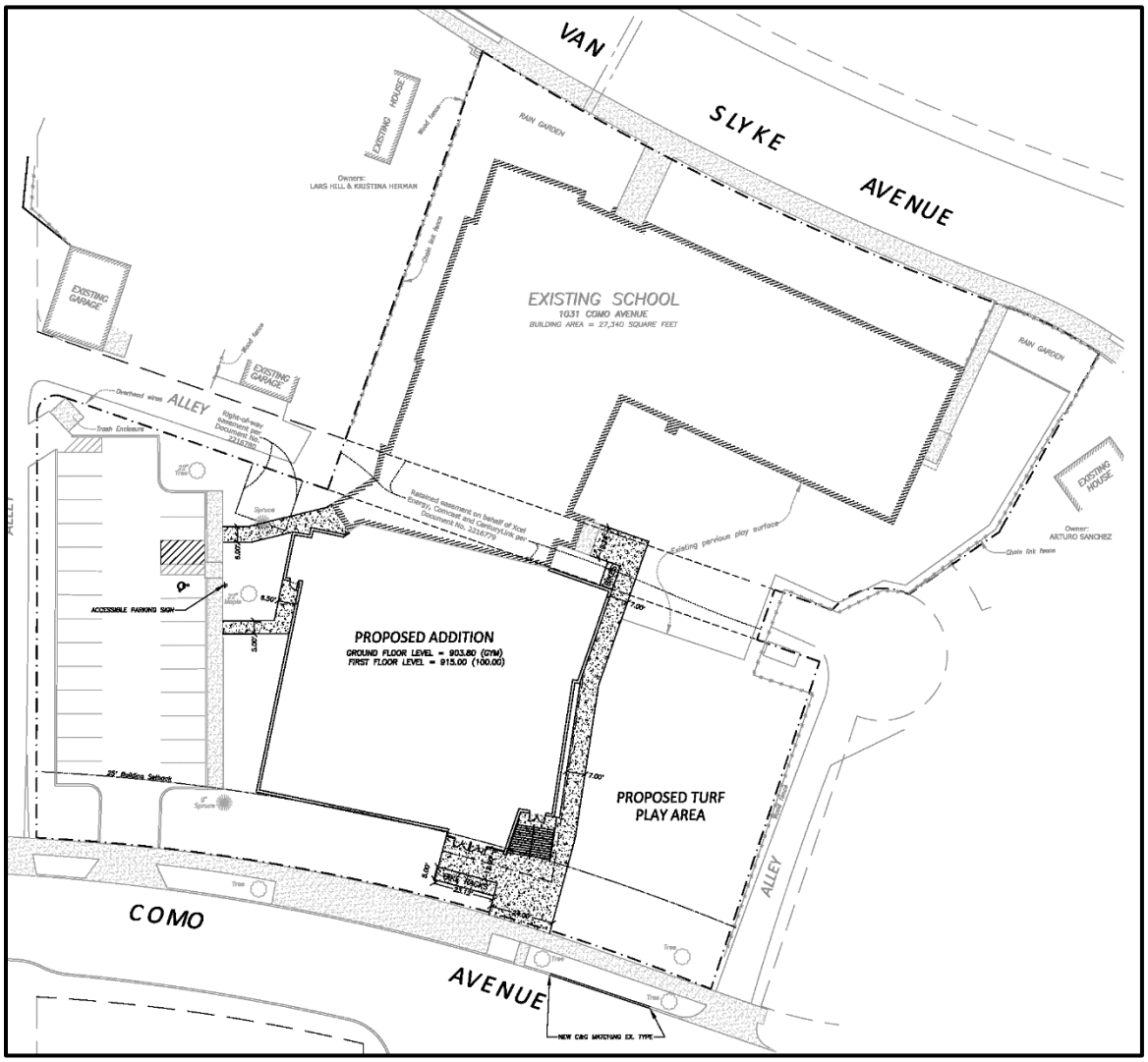
The primary conclusions from the Existing Conditions analysis are:

- Study peak hours of operations occurred from 7:30 – 8:30 a.m., 3:00 – 4:00 p.m., and 4:15 – 5:15 p.m.
- Acceptable operations at the study intersections except for Lexington Parkway/Wynne Avenue/Como Avenue which sees significant stacking on the westbound approach coming from the TCGIS in the a.m. peak hour.
- School drop-off operations in the morning lasts for about 25 minutes and school pick-up operations in the afternoon last for about 15 minutes. This is slightly shorter in duration than expected for an elementary school.
- There were a large number of pedestrian crossings at intersections around the TCGIS in the a.m. and school p.m. peak hours.
- Disordered feel on Como Avenue in front of the TCGIS during the pick-up time with pedestrians, buses, cars, vehicles picking up and parked vehicles all mixed together.
- On-street parking spaces on Como Avenue and Churchill Avenue near the site are heavily parked during the school day, especially around pick-up time.
- Crash history at the study intersections is below the critical crash rate threshold, suggesting the crashes do not represent a systematic safety concern. No fatal or serious injury crashes occurred at the study intersections within the most recent three years of data (2013 to 2015).

3. Proposed Development

The TCGIS is proposing to remodel the southern portion of their site. The TCGIS is forecasting that with the remodeling of the site, student enrollment can grow from the current number of 585 students to 648 students, an increase of 63. Staff members are also expected to grow with the student body, from 81 to 87 employees.

As part of this work, the eastern parking lot with access to Como Avenue will be removed to provide for a new play area. The western parking lot is expected to remain the same with some likely striping revisions for an accessible stall. Based on the current plan, a total of 25 parking spaces will be available for the school after the proposed changes. The graphic below shows the proposed plans. This graphic is also available in the Appendix.



4. Forecasted Traffic

Any changes to the transportation system must be able to accommodate existing as well as projected future traffic. For the purposes of this study, the year 2023 is used as the future scenario, which assumes completion of the proposed changes and the expected growth in students and staff. Forecasting 2023 volumes requires examining both school growth and general growth in the surrounding area.

a. School Traffic Forecasting

The TCGIS currently has an enrollment of 585 students and is projecting a future enrollment of 648 students after the proposed renovations. This is a growth in students of approximately 11 percent. Traffic growth the for the volumes related to the school are also expected to grow by a similar amount. Thus, all school traffic movements in the study network were increased by 11 percent to reflect the expected growth.

b. Non-school Traffic Forecasting

The remaining vehicle volumes are not considered school traffic but reflects the area resident travel as well as through traffic from commuters and other travelers in the general area. For this area of Saint Paul, the current zoning designations suggest little room for additional development around the study area. To account for some general growth in the study area, a growth rate of 0.5 percent per year was assumed to capture future growth. For the future year 2023, a total of three percent growth was applied to the existing traffic volumes at the study intersections.

c. Total Traffic

The total 2023 projected volumes are the sum of the existing school traffic with 11 percent growth and the existing general traffic with 3 percent growth. The volumes for the three different peak hours can be seen in the capacity analysis section of the Appendix for different scenarios.

5. Future Analyses

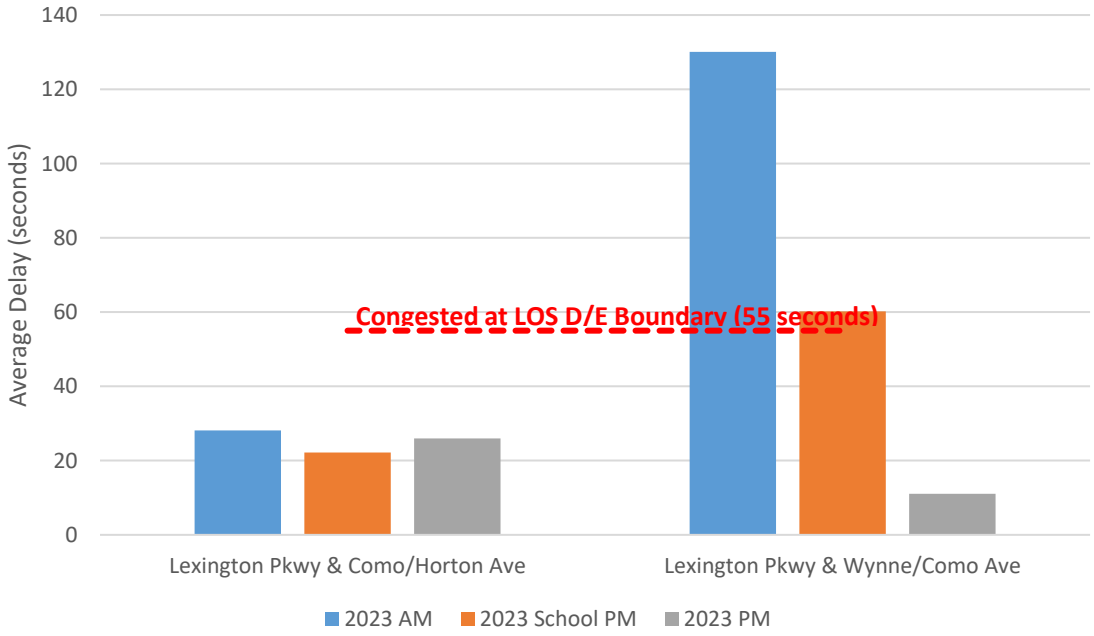
a. 2023 No Change Analysis

To determine where poor operations are or may be occurring, capacity analyses were performed for the study intersections using the forecasted volumes. This capacity analyses and the associated delay calculations were done in accordance with the *Highway Capacity Manual, 6th Edition* using the Vistro software package. The Vistro model used in these analyses utilized a copy the Existing Conditions model with increased volumes, which were calibrated to match observations of each intersection made in the field. The full calculations for each study scenario, including Level of Service (LOS) grades and queue lengths, are included in the Appendix. Also, included in the Appendix is a guide explaining the Level of Service grade concept.

The capacity analyses were conducted for the study intersections during the a.m., school p.m. and p.m. peak hours. Signal timing for the signalized intersections was provided by the City of Saint Paul.

Chart 1 shows the average peak hour delay per traffic signal controlled intersections for the three peak hours. The LOS D/E boundary of 55 seconds of delay per vehicle is considered the threshold between acceptable and unacceptable traffic signal operation in Minnesota.

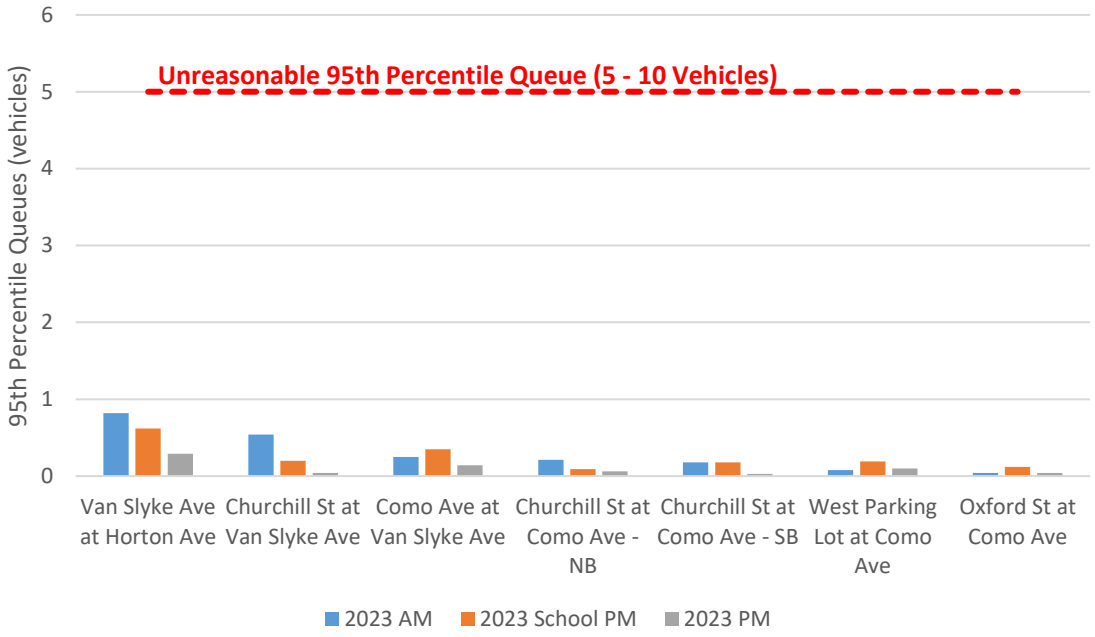
Chart 1 – Peak Hour Delays: Signal Controlled Intersections



Average delays for side-street stop-controlled intersections, while calculated and included in the Appendix, can be misleading for intersections with side-street stop

sign control because the vast majority of vehicles are through movements on the main roadway and have zero delay, skewing the overall average delays. At side-street stop sign controlled approaches to busy roadways, the average delay for all vehicles on the approach can often exceeds 60 seconds. This result can be the case for a few vehicles waiting at the stop sign where improvements would not be justified due to the low traffic volume. Instead of reporting average approach delays as in the previous charts, Chart 2 shows the 95th percentile queue as the measure of effectiveness at intersections with side-street stop sign control. Based on our experience, improvements are not warranted at these types of intersections until the 95th percentile queue at a stop sign is in the five to ten vehicle range.

Chart 2 – Peak Hour Queues: Side-Street Stop-Controlled Intersections



As shown in Charts 1 and 2, most intersections and movements are forecasted to operate within the typical range of acceptability throughout the three peak hours in the year 2023. The exception to this is the Lexington Parkway & Wynne Avenue/Como Avenue intersection which is forecast to have high delays in the a.m. and school p.m. peak hours. This result is due to the westbound approach operations at the intersection seeing high delays and long queues. The other three approaches at the intersection are forecast to operate with acceptable delays.

b. Parking Analysis

The City of Saint Paul's Code of Ordinances states in Section 63.207 that for elementary schools, the minimum number of parking spaces required to be provided is equivalent to one space per employee. With 87 staff proposed with the building remodel, 87 parking stalls are needed for the site.

The site is proposing a parking lot with 26 parking spaces, 24 standard stalls with two accessible stalls. This striping design meets the accessible parking requirements according to Saint Paul Ordinance Section 63.213 for parking lots with between 26 and 50 spaces. However, this lot falls 61 stalls short of the overall City requirement.

The TCGIS has an approved agreement with the Mission Orthodox Presbyterian Church (OPC) on the south side of Como Avenue for 15 shared use parking spaces in the OPC lot. Located to the south of the TCGIS, this lot is used by staff and easily accessible by the adjacent sidewalk and a crossing of Como Avenue. With these spaces, the school's parking shortfall is reduced to 46 spaces.

The City allows a reduction in the minimum parking requirement when an equivalent amount of secure bicycle parking is provided. Four spaces in a secure bicycle rack are the equivalent of one vehicle parking space. If the TCGIS provided 36 bicycle spaces, in nine racks, the vehicle parking requirement would be reduced by nine spaces. This reduction would further decrease the school's shortfall to 37 spaces.

The TCGIS has indicated that of the current 81 staff members, 16 of them do not drive to school but get to the school via bicycle, transit or walking. This information reinforces that the parking requirement can be reduced with the provided bicycle racks.

To be able to determine the availability of on-street parking around the TCIGS open to use by school staff, the parking counts from the Existing Conditions memorandum are used. Those parking counts included on-street parking demand counts at 9:30 p.m. For residential land uses, the overnight hours are the time of peak parking demand. Because of that, it is assumed the counts conducted at 9:30 p.m. represent the peak parking demand for the residents. Comparing those counts to the number of available on-street parking spaces, the number of spaces not being used for residential use can be determined. Figure 1 shows the availability of on-street parking spaces around the TCGIS.

Figure 1 – Available On-Street Parking Spaces Not Being Used by Residential Uses

As shown in Figure 1, there is ample on-street parking availability of over 200 spaces immediately around the TCGIS building to accommodate 37 vehicles from the TCGIS.

It is noted that there is a surge of on-street parking demand in the study network before and after school due to pick-up/drop-offs for the school occurring on surrounding roads. This surge can be seen in Table 1 of the Existing Conditions memorandum. Accounting for the available on-street parking spaces not being used by residential uses as shown in Figure 1, there are more than enough spaces to accommodate the up to 80 vehicles parking around the TCGIS building during the a.m. peak hour and 130 vehicles in the school p.m. peak hour.

6. Improvement Options

a. Issues

From the Existing Conditions memorandum as well as the 2023 analysis, the issues surfaced in the study area around the TCGIS include:

- Pedestrian crossings, including many school children, occurring at multiple locations along Como Avenue near pick-up/drop-off vehicle operations.
- Unassisted pedestrian crossings at all intersections surrounding the TCGIS.
- Vehicle stacking for pick-ups on the north side of the TCGIS building currently extending all the way to Lexington Parkway. With an 11% increase in students, that queue will extend beyond/onto Lexington Parkway.
- Vehicle stacking for pick-ups on the south side of the TCGIS building extending to Van Slyke Avenue and conflicting with bus loading zones. With an 11% increase in students, these conflicts will become more regular.
- Vehicle queues on westbound Como Avenue at Lexington Parkway extending to Oxford Street at the start of the school day and past Churchill Street at the end of the school day. With an 11% increase in students, this queue will increase.
- Disordered mix of pedestrians, buses, parked vehicles, through vehicles and pick-up vehicles around the TCGIS, especially on the Como Avenue side of the building, at the end of the school day.
- Significant amount of on-street parking being occupied by vehicles related to the TCGIS, both for staff and pick-ups/drop-offs, on surrounding residential roadways around school start and end times.

b. Potential Alternatives

To deal with the different issues identified, different alternatives can be explored which can address one or multiple issues. However, any alternative is likely to present a trade-off compared to the existing conditions. Various potential alternatives are explored below, noting both positive and negative impacts.

Marked Pedestrian Crossing

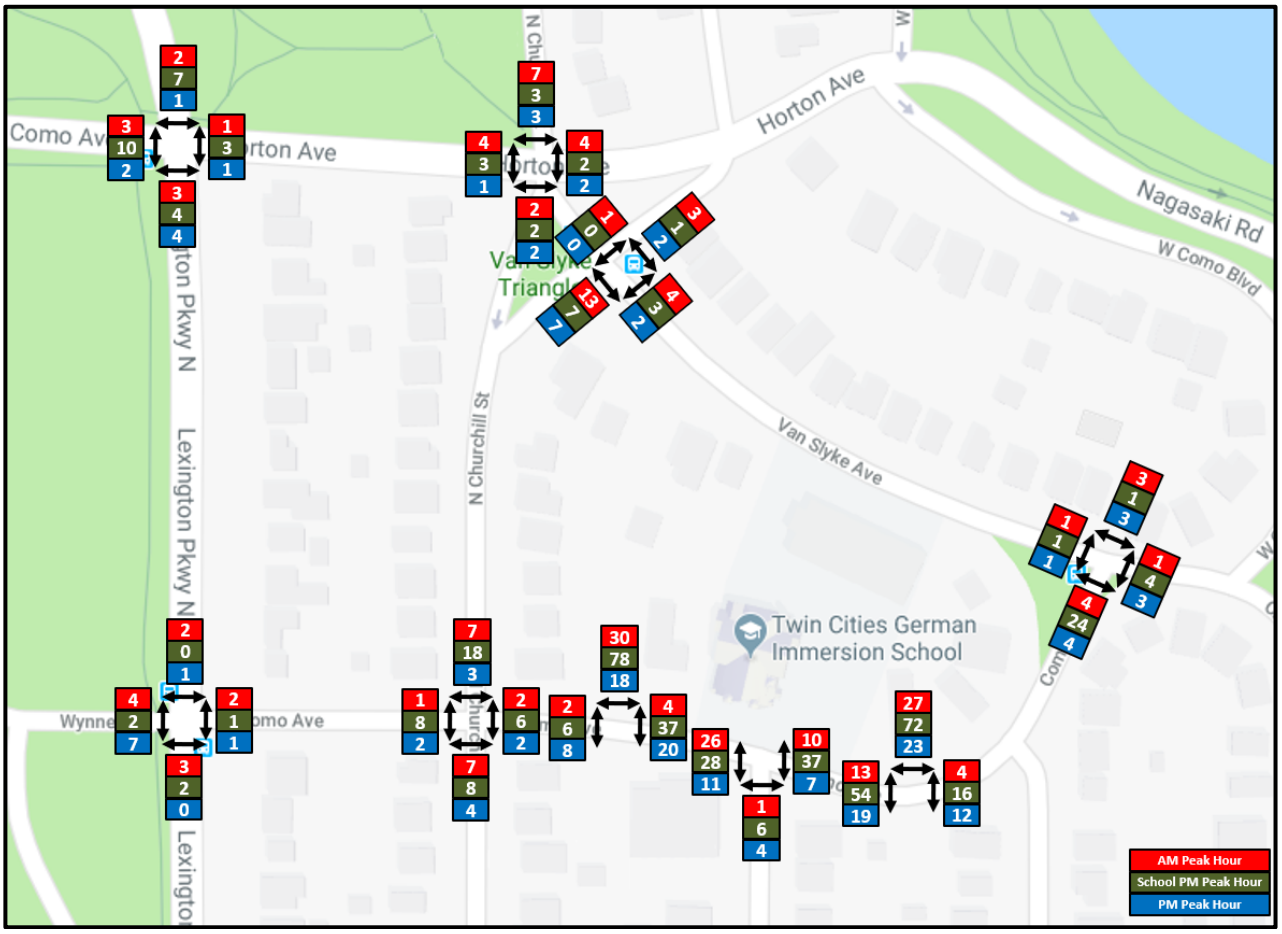
As previously mentioned, there is a large amount of pedestrian activity around the TCGIS building, especially around Como Avenue. Figure 2 below shows the peak hour pedestrian/bicycle crossing volumes at each leg of the study intersections adjusted for the future scenario where the TCGIS sees an 11% increase in students.

As seen in Figure 2, there are large numbers of pedestrians/bicycles crossing Como Avenue near the TCGIS during all three peak hours. It is noted that nearly all of these are pedestrians with a small number of bicycles. Between Churchill Street and Argyle Street, the total number of pedestrian crossings on Como Avenue is 61 in the a.m. peak hour, 184 in the school p.m. peak hour and 79 in the p.m. peak hour.

According to the Local Road Research Board's (LRRB) *Pedestrian Crossings: Uncontrolled Locations*, marked crossings on roadways with speeds of 35 mph or

less can be placed at locations with a minimum of 20 pedestrian crossings during at least one hour of the day. With the high pedestrian crossings on Como Avenue, a marked crossing would be able to be justified.

Figure 2 – Peak Hour Pedestrian/Bicycle Crossing Volumes with TCGIS Renovations



Currently, as seen in Figure 2, the pedestrian crossings across Como Avenue are spread from Churchill Street to Argyle Street with many of them occurring around the parking lot accesses and Oxford Street. However, there is not a set crossing location which means that crossings are occurring in a number of different locations. Pedestrians going to/from the TCGIS are encouraged to cross on the east side of the Como Avenue & Oxford Street intersection, but, as seen in Figure 2, while some crossings occur here, the majority do not. Having one location where the heavy majority of pedestrians are crossing will improve safety on Como Avenue by setting clearer expectations for drivers and pedestrians.

Pedestrian crossings are best placed where pedestrians have a clear view of traffic from either direction and where drivers can easily see pedestrians from far enough away to be able to come to a stop. At 30 mph, a vehicle needs 200 feet to see an object in the road and come to a full stop. With the curve on Como Avenue east of

Oxford Street, placing the marked crosswalk on the west side of the Como Avenue & Oxford Street intersection would provide the needed 200 feet stopping sight distance for vehicles on either side of the crossing. Curb ramps already exist at this location. Marking the crossing would help keep loading vehicles from parking in the crosswalk.

If a marked crosswalk is included on the west side of the Como Avenue & Oxford Street intersection, the TCGIS should guide all pedestrian crossings, students and parents/guardians, to use this crosswalk to get across Como Avenue. Having crossing guards at this one location for peak periods before and after school would also reinforce that this is the location to cross at.

This location is right where the pick-up/drop-off operations occur on the south side of the TCGIS meaning pedestrians and vehicles will be intermixed. Having staff guide vehicles and having crossing guards guide pedestrians will help aid in safety.

Looking at Figure 2 for other busy crossing locations, the northbound approach on Como Avenue at Van Slyke Avenue and the northeast bound approach on Churchill Street at Van Slyke Avenue stand out due to their higher volumes. The crossings on Como Avenue at Van Slyke see an increase in the school p.m. peak hour due to a bus loading location east of Como Avenue. The students that make this crossing to get to the bus are already accompanied by a staff member. The Churchill Street crossing location sees low enough traffic volumes that mitigation may not be necessary but crossing guards could be helpful.

Signal Timing Updates

As noted in field observations and shown in Chart 1, the Lexington Parkway & Wynne Avenue/Como Avenue intersection sees poor operations in the a.m. and school p.m. peak hours. This is due entirely to the westbound approach at the intersection; the other three approaches operate acceptably. With a majority of the TCGIS traffic occurring in highly concentrated time periods in the a.m. and school p.m. peak hours, there is more demand at the Lexington Parkway & Wynne Avenue/Como Avenue signal during those periods than the existing timing is programmed for.

Updating the signal timing at this intersection to allow for more green time for the westbound approach during the peak 15-minute periods of the a.m. and school p.m. peak hours, will reduce the queues and delays for vehicles leaving the TCGIS. Reducing long delays for vehicles is a safety benefit at the signalized intersection as drivers that have been waiting longer to get through an intersection are more likely to take risks to get through the intersection, such as proceeding on a red. The reduced queue lengths will also benefit pedestrian crossings on Como Avenue in front of the TCGIS. Currently, the westbound a.m. peak hour queues on Como Avenue stretch to Oxford Street. With an 11% growth in students, this queue will increase to beyond Oxford Street, through the recommended marked pedestrian crossing.

Any signal timing changes that give more time to Como Avenue will negatively impact operations on Lexington Parkway which serves significantly more vehicles than Como Avenue/Wynne Avenue. Because of that, it is only recommended that the signal timing changes be for the brief periods that see high concentrations of vehicles leaving the TCGIS. Currently, those periods would be approximately 8:00 to 8:15 a.m. and 3:15 to 3:30 p.m.; the 15 minutes before and after the school day starts and ends.

Staggered Release Times

Currently, the start and end time for all students at the TCGIS is the same. That means that all pick-ups and drop-offs for the school are occurring at the same time. This is common at schools, as having multiple starting and ending times can bring logistical challenges. However, some schools have staggered start and/or end times which helps to spread out the period of pick-ups and drop-offs. Spreading out those periods means they will take longer, but the number of vehicles and pedestrians around the school is not as high at any one time. In the case of the TCGIS, that would mean the pick-up/drop-off vehicle queues, as well as the queues on Como Avenue and Lexington Parkway, would be shorter.

If half of the school, grades 4-8 for example purposes, were to start 15 minutes later than the other half of the school, grades K-3, the pick-up and drop-off periods would be half as busy as they currently are. However, with some students taking buses, the simple staggering time may not work without doubling the number of buses the school uses.

While the a.m. peak hour is busy around the TCGIS, it experiences smoother operation than the school p.m. peak hour because it is easier, and quicker, to drop students off than to pick them up. There is still large queueing on Como Avenue at Lexington Parkway, but the operations around the TCGIS building are less disordered. Because of that, staggered release times may be more prudent for the TCGIS than staggered start times.

Staggered release times could operate a number of different ways. One way would be to release all students in grades K-3 as well as all students that ride the bus at one time. The non-bussing students in grades 4-8 could then be released 15 minutes later. This spreads the pick-up times out so that the first round of pick-ups and bus departures are completed before the second round starts.

Pick-up queues will also be reduced meaning the queues will no longer extend to Lexington Parkway from Van Slyke Avenue. Vehicles waiting to pick-up on Como Avenue would also not extend into the bus loading zone removing blockages on Van Slyke Avenue as buses wait to get into their loading zones. On-street parking demands around the TCGIS would also be lowered during the pick-up period as the pick-up times are spread out. Again, additional logistics would need to be worked out within the school to be able to accomplish this. This could be a longer-term

solution that is implemented in the future once other recommendations have been adopted.

Any signal timing changes at the Lexington Parkway & Wynne Avenue/Como Avenue intersection would need to reflect this new school release pattern and may not be needed.

Re-Orient Pick-up/Drop-off Layouts

One of the issues identified for the TCGIS is the mixing of bus and car traffic. Having cars in the pick-up line stacking into the bus loading zones results in students walking around cars to get to their bus. Also, buses cannot enter their loading area thereby blocking a through lane on Van Slyke Avenue causing vehicles to weave around buses into oncoming traffic.

Fully separating the bus and car loading areas will remove this mixing issue. If buses were located on Oxford Street, Argyle Street or Churchill Street, separation from the car pick-up/drop-off lines on Como Avenue and Van Slyke Avenue would be provided. However, all students riding buses would need to cross at least one roadway to reach the new bus location. A marked crossing and crossing guards would provide some mitigation for these safety implications.

For bus operations to consistently use those roads, general parking restrictions would need to be put in place and enforced. The restrictions and enforcement ensure the buses can always pull curbside for safe student loading/unloading and that the buses do not block a lane of traffic. Residents would be restricted from using the parking in front of their homes for some period of time under this scenario.

A less complicated option to separate cars and buses would be to restrict each of their operations to one side of the school or the other. Como Avenue would be appropriate for bus operations due to the limited stacking on the south side of the school. Six buses could easily park on Como Avenue adjacent to the school (north side) between the TCGIS parking lot and Argyle Street.

The current operations split some student pick-ups on the north side and some on the south side. The north side queue already extends to Lexington Parkway, so adding more pick-ups to this side would increase this queue. Having all of the staff helping with pick-ups located on the same side would help decrease wait time. A staggered release time would also be beneficial with this layout to reduce queues on Van Slyke Avenue.

When using this layout without a staggered release, vehicles picking up students on Van Slyke Avenue could be routed to use northbound Churchill Street to get to Van Slyke Avenue rather than using Horton Avenue. This would give additional stacking room before reaching Lexington Parkway. However, this stretch of Churchill Street would be occupied with queued vehicles during the drop-off/pick-up period, limiting its usability by non-school traffic during those times.

Curb Bump-Outs

Curb bump-outs move the curb or use large physical objects (like planters) to reduce the width of the road at intersections or mid-block locations. These elements, if installed here, could clearly define the loading zones for cars and/or buses. Bump-outs also reduce the width of the street for pedestrian crossings if used in conjunction with a crossing.

To provide a bump-out on the Van Slyke Avenue side of the building, the location is complicated by the Metro Transit bus stop. Avoiding impacts to that bus stop pushes a potential bump-out over 100 feet from the Como Avenue intersection to allow for Metro Transit as well as school bus loading. Student pedestrian crossings were not observed to occur across Van Slyke Avenue, so a bump-out here would not have much impact in aiding pedestrian crossings. Given the potential confusion to drivers and limited impact for pedestrian improvements, a bump-out is of limited value in this location.

Como Avenue has two potential locations for a bump-out at the front of the car loading area; one on the east side of the TCGIS parking lot and one on the west side of the Como Avenue & Oxford Street intersection. Next to the TCGIS parking lot, a bump-out would remove space for one vehicle in the loading zone but provide a shorter crossing to the OPC building and its curb ramp in front of the building. However, the existing legal crossing of Como Avenue on the west side of Oxford Street results in two crossings within 100 feet of each other. This short distance is not ideal as it goes against general driver expectations.

Next to Oxford Street a bump-out would eliminate space for about three vehicles in the loading zone. It is not recommended to split the loading zone in two as that will create stacking and blocking issues. Therefore, the car loading zone would be shifted east increasing the potential for cars to spill back to Van Slyke Avenue and into the bus loading areas. For these reasons, a curb bump-out is not recommended at this location.

On both Como Avenue and Van Slyke Avenue, putting a bump-out to mark the end of the vehicle loading zone is not recommended as there is the potential for the pick-up lines to extend beyond the designated zone, as there is currently seen today. A bump-out would be an impediment in those locations for vehicles in the pick-up line resulting in a higher chance of the traffic lane to be blocked.

Move Pick-up/Drop-off Operations

The main reason the pick-up/drop-off operations at the TCGIS see any issues is that all operations are occurring on public roadways. If the TCGIS had a large lot to accommodate these operations, it would be easier to control many of the factors.

About a quarter mile west of the TCGIS building is a large parking lot for the Como Regional Park Pool and McMurray Fields. If pick-ups were to be moved to this

parking lot, queues and parked vehicles could be removed from the neighborhood streets and everything would occur in this lot. This would, of course, need to be worked out with the other uses at the parking lot.

The biggest challenge to this is getting students to/from the parking lot. In good weather, staff could walk students over in large groups, but for much of the time buses would need to be utilized to move students. Close coordination would need to occur for getting students off of the buses and into the car that is picking them up. Utilization of the PikMyKid app would help. Students may end up waiting outside for a time after getting off the buses.

Signal timing updates may need to occur at the Lexington Parkway & Wynne Avenue/Como Avenue intersection since a majority of the school traffic is utilizing the west leg of this intersection rather than on the east leg.

Guide Staff Parking Locations

Depending on the layout used for pick-up and drop-off operations, the TCGIS should instruct staff members to not park in areas that will conflict with these operations. For example, when there are vehicles parked on the north side of Como Avenue east of Oxford Street during the pick-up period, vehicles in the pick-up line must weave around these parked vehicles, essentially blocking the through lane.

It is recommended staff using on-street parking not park in the following locations:

- The north side of Como Avenue between Churchill Street and Van Slyke Avenue. This will reduce conflicts/weaving between pick-up/drop-off vehicles and parked vehicles.
- The south side of Como Avenue between the alley west of Oxford Street and Argyle Street. This will aid in reducing parking near a marked pedestrian crossing to give better sight lines of the crossing. It will also reduce parking on the curve on Como Avenue which sees a mix of cars, buses and pedestrians in the peak periods.

Time of Day Parking Restrictions

Similar to guiding staff parking locations, extending the time-of-day parking restrictions on the north side of Como Avenue from the front of the TCGIS building to the Van Slyke Avenue intersection would remove conflicts between parked vehicles and vehicles in the drop-off/pick-up lines. This stretch of Como Avenue is in front of several residences and may impact the residents' ability to park in front of their homes, however these residences can utilize off-street parking or park on the other side of Como Avenue.

Close Van Slyke Triangle

Within the study area, the Van Slyke Triangle does not specifically relate to the TCGIS but does impact users of the TCGIS. This portion of land located on the southwest side of the Van Slyke Avenue & Churchill Street intersection functions as a channelized right turn onto Churchill Street. With the low volumes in the area, a separated right turn movement is not needed from an operational standpoint. Similar to the nearby Leroy Triangle at Como Avenue & Chatsworth Street, the Van Slyke Triangle could be closed with the intersection reconfigured. This change would reduce the number of crossings for pedestrians along Van Slyke Avenue as well as remove the conflict point located on the curve of Churchill Street. Besides cost, the on-street vehicle parking supply would be reduced by about four spaces. Sidewalks would also need to be reconfigured, with one option to extend the house connections to the street. Figure 3 shows an illustration of this potential alternative.

Figure 3 – Alternative: Close Van Slyke Triangle

Different stakeholders would need to be involved to complete this road closure. The City of Saint Paul would need to lead the project, involving residents of the area. Although a good idea from an overall transportation standpoint, this change has a minimal impact on the specific school operations. Given the City needs to lead this type of improvement and the minimal impact on school operations, closing the Van Slyke Triangle is outside of the recommendations for the TCGIS. The City is encouraged to consider and implement this change.

c. Potential Alternative Analysis

Table 1 summarizes some of the positive and negative impacts of the different alternatives.

Table 1 – Alternative Impacts

Potential Alternative	Positive Impact		Negative Impact	
A Marked Pedestrian Crossing	Move pedestrian crossings to one location	Clarify driver and pedestrian expectations	Pedestrian crossings located at pick-up/drop-off location	
B Crossing Guards	Aid in safety of pedestrian crossings			
C Signal Timing Updates	Reduce queues on Como Avenue	Improves safety for pedestrians crossing Como Avenue	Increase delay on Lexington Parkway	
D Staggered Release	Lower intensity of pickup period	Reduced queues and congestion	Extend pickup period	Additional in-school logistics
E Re-Orient Pick-up/Drop-off Layout	Separate cars and buses		Extended queue on Van Slyke Avenue	
F Curb Bump-Outs	Reduce pedestrian crossing distance.	Define loading areas.	Increase chances of blocking	Shift loading zones.
G Move Pick-up/Drop-off Operations	Pickups occur in more controlled area	Remove queues and parking from neighborhood streets	Need to get students to/from lot	Students potentially more exposed to the weather
H Guide Staff Parking Locations	Reduce impact to pick-up/drop-off operations			
I Time-of-Day Parking Restrictions	Remove conflicts in pick-up/drop-off line on Como Avenue		Impact parking for adjacent residents	
J Close Van Slyke Triangle	Remove pedestrian/vehicle interaction point	Reduce confusion on south end of triangle	Lose four on-street parking spaces	

Based on this, the recommended alternatives to be implemented, along with the order of impact (Impact 1 being the highest impact and Impact 7 being the lowest impact), are:

- A – Marked Pedestrian Crossing (Impact 4)
- B – Crossing Guards (Impact 3)
- C – Signal Timing Updates (Impact 2)
- D – Staggered Release (Impact 1)
- H – Guide Staff Parking Locations (Impact 6)
- I – Time-of-Day Parking Restrictions (Impact 5)
- J – Close Van Slyke Triangle (Impact 7)

In terms of timing, alternatives B and H could be implemented at any point. The other alternatives would take longer to implement, with the TCGIS needing to work with the City of Saint Paul on alternatives A, C and I and the City of Saint Paul needing to implement alternative J.

Regarding cost of each alternative, alternative H would have no cost and alternative B would have minimal to no cost. All other alternatives would have some cost to them in terms of the TCGIS staff time, City of Saint Paul staff time and materials. Alternative J would likely have the highest cost for the City to implement.

To see the impacts to the roadway network with this combination of alternatives, the study intersections were analyzed in each of the three peak hours. Alternatives A and J were included in the capacity analyses for each peak hour. Alternative C, signal timing updates, was only included in the a.m. peak hour and alternative D, staggered release, was only included in the school p.m. peak hour. Alternative B has a similar impact to intersection operations in the capacity analysis as alternative A while alternatives H and I do not impact the intersection operations. Charts 3 and 4 show the delay and queueing results at the study intersections with year 2023 volumes and the recommended alternatives.

Chart 3 – Peak Hour Delays: Signal Controlled Intersections – With Recommended Alternatives

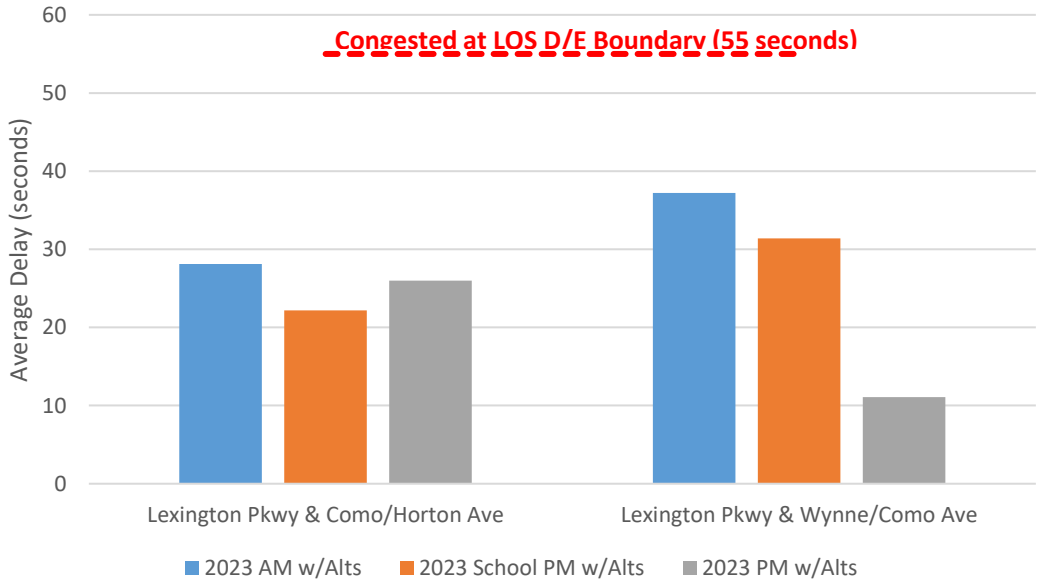
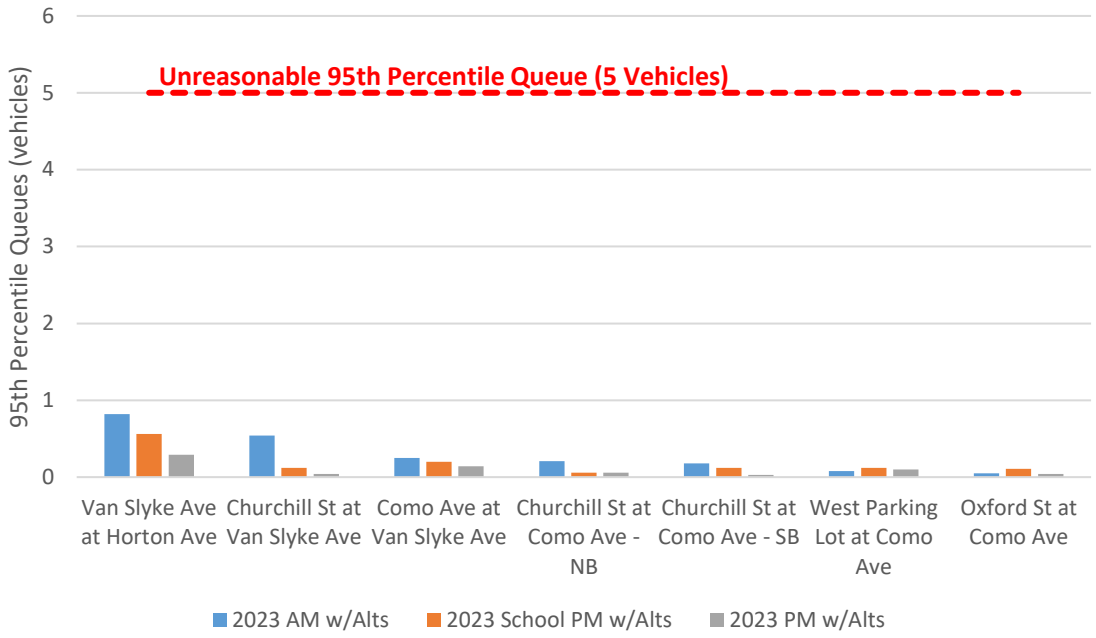


Chart 4 – Peak Hour Queues: Side-Street Stop-Controlled Intersections – With Recommended Alternatives



As seen in Charts 3 and 4, with the recommended alternatives the study intersections are forecast to operate acceptably in the 2023 peak hour scenarios.

Comparing Charts 3 and 4 to Charts 1 and 2, the most notable operational change with the addition of the recommended alternatives is at the Lexington Parkway & Wynne Avenue/Como Avenue intersection. This is due to the additional green time at the signal for the westbound approach in the a.m. peak hour and the spreading out the release times in the school p.m. peak hour. The 95th percentile queues on Como Avenue at the intersection with the recommended alternatives are forecast to extend beyond Churchill Street in the a.m. and school p.m. peak hours, but not to reach back to the TCGIS parking lot. This means that these queues will not extend into the recommended marked pedestrian crossing.

At the Lexington Parkway & Wynne Avenue/Como Avenue intersection, modifying the signal timing to give more time to the eastbound/westbound approaches means that the northbound/southbound approaches will encounter a red at the signal more often. Comparing the results of the 2023 analyses with and without the recommended alternatives, the only significant impact to the operations on the Lexington Parkway approaches is the southbound approach will see an increase in delays and queues in the a.m. peak hour. This increase is equivalent to approximately 15 seconds of delay per vehicle and the 95th percentile queue length will increase to 540 feet from 360 feet. With 600 feet of stacking availability on Lexington Parkway before reaching the Como Avenue/Horton Avenue intersection, this queue can be accommodated. If the school p.m. peak hour were to see signal timing changes at Lexington Parkway & Wynne Avenue/Como Avenue instead of a staggered school release time, the intersection would operate acceptably.

7. Conclusions and Recommendations

The traffic impacts of the TCGIS renovations were thoroughly studied and the principal findings are:

- The study intersections currently operate acceptably in all three peak hours in the existing and year 2023 scenarios with the exception of the Lexington Parkway & Wynne Avenue/Como Avenue intersection in the a.m. and school p.m. peak hours in the existing and year 2023 scenarios.
- None of the study intersections have a crash issue based on the latest three years of available crash data.
- Traffic is expected to increase both from expansion of the school's population and generic growth the area.
- Parking demands from the TCGIS can be accommodated on-street on the surrounding roadways.
- Current issues around the TCGIS during the pick-up/drop-off times include large amounts vehicle stacking at the school building, vehicle stacking on westbound Como Avenue at Lexington Parkway, large number of pedestrian crossings at multiple locations on Como Avenue, and a general mixing of pedestrians, buses, moving cars, parked cars and pick-up/drop-off cars.
- With the recommended alternatives in place, the Lexington Parkway & Wynne Avenue/Como Avenue intersection is forecast to operate acceptably in all peak hours in the year 2023.

The following recommendations are made based on the above findings:

- Add a marked pedestrian crossing on Como Avenue on the west side of the intersection with Oxford Street. Everyone going to/from the TCGIS needing to cross Como Avenue should be directed to this crossing. Crossing guards should be utilized before and after school as needed.
- Implement staggered release times for the end of the school day with 15 minutes between each half of the school being released.
- Modify the weekday school year signal timing between approximately 8:00 and 8:15 a.m. at the Lexington Parkway & Wynne Avenue/Como Avenue intersection to accommodate more green time for the westbound approach. Similarly, modify the signal timing between approximately 3:15 and 3:30 p.m. unless staggered release times are implemented at the TCGIS.
- Instruct staff of the TCGIS to not park on-street at either of the following two locations:
    - The north side of Como Avenue between Churchill Street and Van Slyke Avenue.
    - The south side of Como Avenue between the alley west of Oxford Street and Argyle Street.
- Extend the time-of-day parking restrictions on the north side of Como Avenue from in front of the TCGIS building to the Van Slyke Avenue intersection.
- The City of Saint Paul consider and close off the Van Slyke Triangle.

8. Appendix

A. The Language of Traffic Engineering

B. Concept Site Plan

C. Existing Conditions Memo without Appendices B-D

D. Level of Service (LOS)

E. Capacity Analysis Backup

- AM 2023
- School PM 2023
- PM 2023
- AM 2023 with Recommended Alternatives
- School PM 2023 with Recommended Alternatives
- PM 2023 with Recommended Alternatives

The Language of Traffic Engineering

Traffic Engineering, and Traffic Engineers, often use technical terms or jargon that may be confusing or tough to understand even within the context of a sentence. Key terms and acronyms that can generally be found in all types of traffic studies are defined in this document.

Types of Studies

Access Management – The practice of government agencies limiting the amount of intersections (both public roadway crossings and private driveways) along a roadway corridor based on the function of the roadway to improve safety and mobility while streamlining access.

Corridor Study – A transportation review and analysis of the existing and future traffic operations of a roadway segment. Varies in length from a couple blocks to a few miles and typically covers all modes of travel.

Intersection Control Evaluation (ICE) Report – A document that examines and determines the most appropriate type of control (stop sign, signal, roundabout, or other) at one or more intersections.

Safety Study – An examination of crash records to identify potential trends, issues, and problem intersections/ corridors. Usually includes potential mitigation options expected to decrease crash rates in the future.

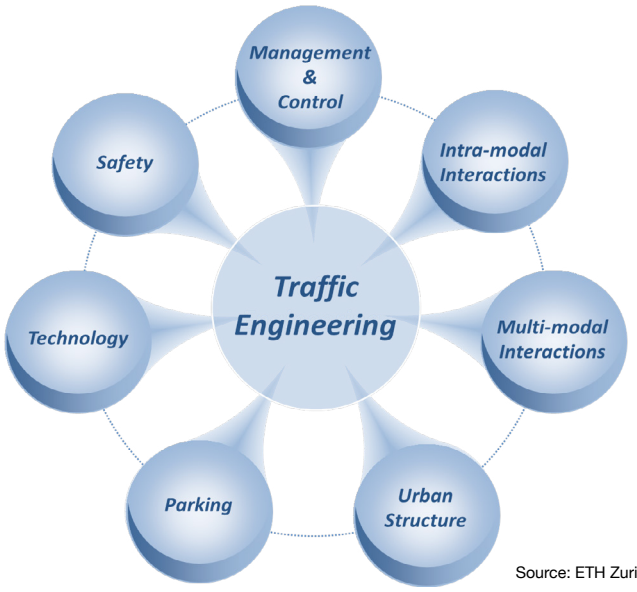
Speed Study – A review of existing travel speeds and the corridor characteristics to determine if speeding is an issue, the appropriate speed to post as the limit, and/or areas to provide reduced speed warnings.

Traffic Impact Study (TIS) – A document that addresses the expected traffic impacts of a development and, if necessary, mitigation options that will reduce or eliminate negative impacts. Also referred to as a Traffic Impact Analysis.

Transportation Plan – A document developed by a government agency to take inventory of their transportation network, identify concerns or issues and lay out the path for improvement of the system.

Travel Demand Management Plan (TDMP) – A plan that documents the existing infrastructure around a site, including transit and non-motorized vehicle options, and develops measures to be implemented to encourage those alternative modes of travel.

Warrant Evaluation – Review of traffic volumes and other characteristics at an intersection against thresholds to determine if a traffic signal or other traffic control option is needed/warranted.



Source: ETH Zurich

Traffic Engineering is a branch of civil engineering that focuses on the safe and efficient movement of people and vehicles. It is part science and part art, requiring not only technical skills for analysis but an understanding of motivations in choosing travel routes.

Key Organizations

AASHTO – American Association of State Highway and Transportation Officials. A nonprofit, nonpartisan association representing transportation departments with a primary goal of fostering the development, operation, and maintenance of an integrated national transportation system.

DOT – Department of Transportation. Government organizations within federal and state agencies dedicated to serving the transportation needs of the community and typically responsible for study, design, operation, and maintenance of all facets of transportation.

FHWA – Federal Highway Administration. An agency within the US Department of Transportation that supports State and local governments in the design, construction, and maintenance of the highway system.

ITE – Institute of Transportation Engineers. An international educational and scientific association of transportation professionals who are responsible for meeting mobility and safety needs.

Appendix A - The Language of Traffic Engineering

Results

85th Percentile Speed – Speed at which 85 percent of drivers are traveling at or below. Speed limits are typically set at the 85th percentile speed.

95th Percentile Queue – The distance, generally measured in feet or number of vehicles, which will be exceeded in a lane, typically at an intersection, only five percent of the time. Usually used to help determine intersection turn lane lengths.

Control Delay – The total amount of time a motorist takes to get through a road segment or intersection minus the time it would take without stopping due to traffic controls (like stop signs or traffic signals). Control delay includes decelerating and accelerating back to full driving speed.

Functional Classification – the grouping of streets and highways into categories according to their characteristics and emphasis on mobility or access. Generally, categories include arterials (emphasizing mobility and fast travel), local roads (emphasizing access to adjoining properties), and collector roads (emphasizing a balance between the two and usually connecting arterials to local roads).

Intersection Delay – The average amount of time, usually expressed in seconds, experienced by any vehicle traveling through an intersection.

Level of Service (LOS) – Qualitative measure of traffic operations related to the amount of average delay experienced. Expressed in letter grades with LOS A representing the best operations with little to no delay and LOS F representing the worst operations with excessive delays and congestion.

Measures of Effectiveness – Performance measures that define how well traffic is moving along a corridor or thru an intersection. The common MOEs are travel time, corridor speed, delay, and queues.

Mitigation – Measures intended to reduce the impact of a development or improve an identified traffic issue by either improving capacity (like adding lanes) or reducing demand (like encouraging carpooling).

Queue – Length of line of cars waiting at an intersection or at a bottleneck in a corridor, typically measured for each individual lane of traffic in feet or number of vehicles.

Volume to Capacity (v/c) ratio – the number of vehicles through an intersection or roadway segment in a specific amount of time divided by the expected capacity of the road. Less than 1.0 indicates available capacity and above 1.0 indicates more vehicles than can be accommodated. Typically, a v/c ratio above 0.85 suggests operational issues.

Trip Generation – The amount of vehicle traffic generated by a land use. One trip is equal to one vehicle traveling from an origin to a destination (traveling to and from work equals two trips).

Warrants – Criteria based on volumes and other Measures of Effectiveness for determining when all way stop signs, roundabouts, traffic signals, or other type of control should be installed.

Important Manuals/Guides

HCM – Highway Capacity Manual (released by the Transportation Research Board, or TRB). The guide for engineers and planners to assess traffic and environmental effects of highway projects. This manual presents the foundation of traffic analysis procedures in the US.

MUTCD – Manual of Uniform Traffic Control Devices. A document that sets minimum standards and provides guidance to ensure uniformity of traffic control devices (such as messages, location, size, shapes, and colors) across the nation. All roads are subject to its jurisdiction.

HSM – Highway Safety Manual (released by AASHTO). A guide that presents a variety of methods for quantitatively estimating crash frequency or severity.

Resources

MUTCD, 2009 Edition, published by FHWA

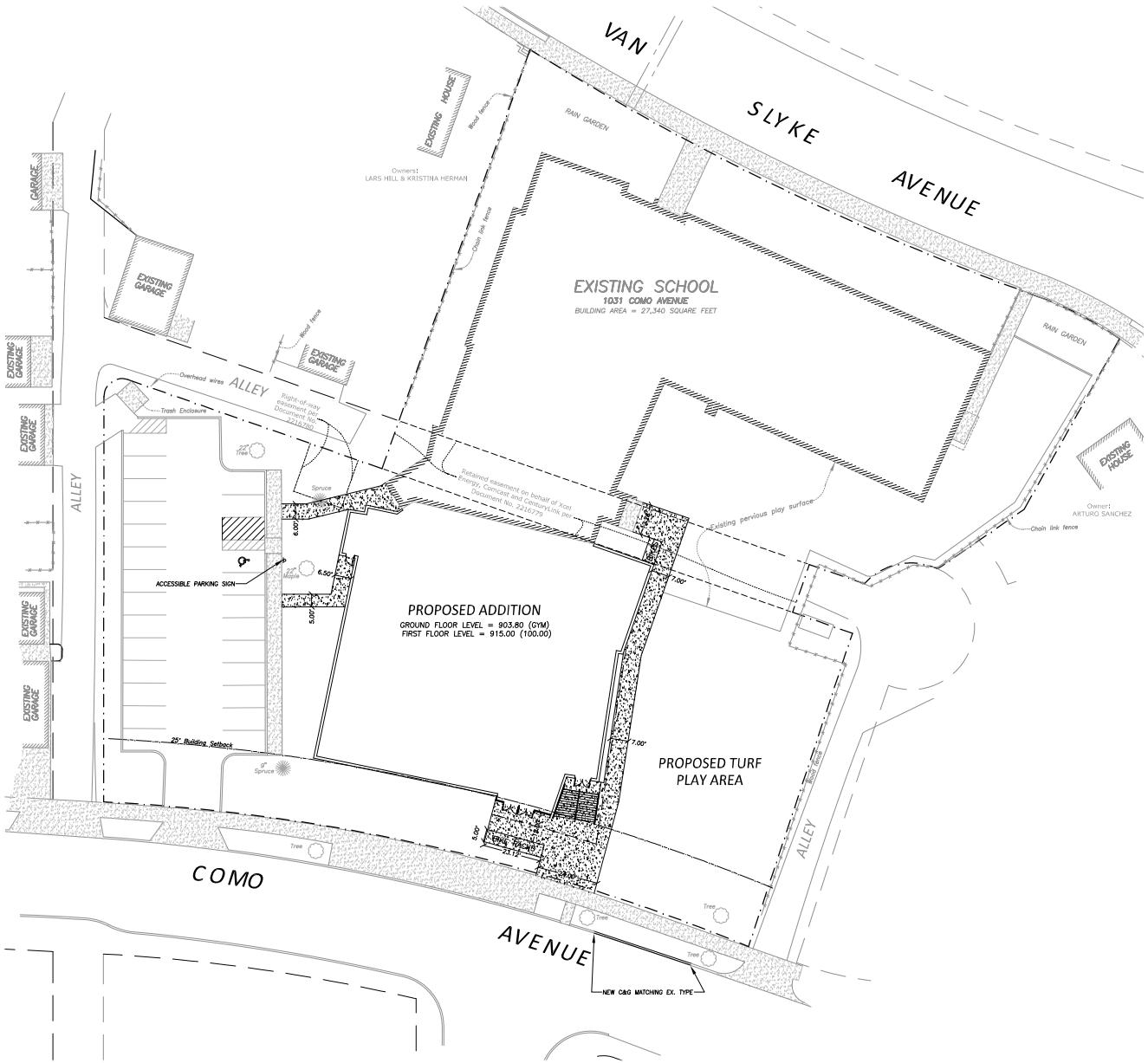
Highway Capacity Manual, HCM6

Highway Safety Manual, HSM

About This Brief

Spack Consulting prepared this brief as part of our company's vision to significantly improve the practice of traffic engineering and transportation planning. Transportation professionals from around the world have assisted us in developing this document. We are providing this brief under the Creative Commons Attribution License. Feel free to use-modify-share this guide, but please give us some credit in your document. To request our whole series of Design Briefs and to be included on our distribution list for new materials, please email mspack@spackconsulting.com. And please reach out if you have any comments or questions related to this Design Brief.

Appendix B - Concept Site Plan



SITE DATA

SITE AREA = 77,471
PRINCIPAL BUILDING COVERAGE = 30,290/77,471 = 39.1%
HARD SURFACE COVERAGE = 42,935/77,471 = 55.4%
(PERVIOUS PLAY SURFACE NOT INCLUDED)

PARKING STALLS REQUIRED

	FTE	STALLS
SCHOOL STAFF (FTE)	85	
TOTAL	85 X 1 STALL/FTE =	85

PARKING STALLS PROVIDED

STANDARD STALLS	ACCESSIBLE STALLS	COMPACT STALLS	TOTAL
24	1	0	25

LEGEND

- PROPOSED CONCRETE
- W — EXISTING WATERMAIN
- S — EXISTING SANITARY SEWER
- ST — EXISTING STORM SEWER
- G — EXISTING BURIED GAS LINE
- E — EXISTING BURIED ELECTRIC LINE
- C — EXISTING BURIED COMMUNICATION LINE

N

0 10 20 40 60
Scale in Feet

Rehder & Associates, Inc.
Civil Engineers, Planners and Land Surveyors
3440 Federal Drive, Suite 110 • Eagan, Minnesota 55122
(651-452-5601 • Fax (651-452-0757 • email info@rehder.com

PROJECT NO.: 181-3062.011 DRAWING FILE: 3062011.DWG

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

PRELIMINARY

Name Date Reg. No.

Issued
CITY SITE PLAN REVIEW 10-23-18

SITE DIMENSION PLAN
TWIN CITIES GERMAN IMMERSION SCHOOL
IMMERSION SCHOOL
CITY OF ST. PAUL

SHEET NUMBER
C1

Spack CONSULTING
ENGINEERING TRAFFIC FORWARD

Technical Memorandum

To: Rich Swedberb, TCGIS Board Chair
From: Bryant Ficek, PE, PTOE
Max Moreland, PE
Date: November 29, 2018
Re: Twin Cities German Immersion School – Existing Conditions

---

The Twin Cities German Immersion School (TCGIS) is proposing building renovations to accommodate expected student growth and update their facilities. A traffic study is underway to review the impacts of these renovations on the surrounding roadway network. This memorandum is a part of the overall traffic study and documents the existing conditions around the TCGIS.

Study Area

To cover the intersections that are most significantly impacted by traffic generated by the TCGIS, the following intersections are included for primary review:

1. Lexington Parkway & Como Avenue/Horton Avenue
2. Horton Avenue & Van Slyke Avenue
3. Van Slyke Avenue & Churchill Street
4. Como Avenue & Chatsworth Street
5. Lexington Parkway & Wynne Avenue/Como Avenue
6. Churchill Street & Como Avenue
7. Como Avenue & West Parking Lot
8. Como Avenue & Oxford Street
9. Como Avenue & East Parking Lot

Figure 1 in the Appendix shows the location of the study intersections.

Transportation Network Characteristics

Lexington Parkway is Ramsey County State Aid Highway (CSAH) 51. In the study area, Lexington Parkway is a partially undivided, two-lane road with left turn lanes at study intersections. Northbound Lexington Parkway widens to two northbound lanes between Como Avenue/Horton Avenue and Wynne Avenue/Como Avenue. The speed limit is 30 mph. There is a sidewalk on the east side of the road and a trail on the west side of the road. On-street parking is not permitted.

Como Avenue west of Lexington Parkway is Ramsey CSAH 31. East of Lexington Parkway this road becomes Horton Avenue and is a City street. This is a two-lane, undivided road with a 30-mph speed limit. Sidewalks/trails are on both sides of the road and on-street parking is generally permitted.

Wynne Avenue west of Lexington Parkway becomes Como Avenue east of Lexington Parkway. Wynne Avenue is a two-lane, undivided road with a 25-mph speed limit and a right turn lane at the Lexington Avenue intersection. Wynne Avenue has a trail on the north side of the road and on-street parking is not permitted. Wynne Avenue leads to large parking lots for the surrounding playfields and pool. Como Avenue is a two-lane, undivided road with a 30-mph speed limit. Como Avenue has sidewalks on both sides and on-street parking is permitted. The north side of Como Avenue in front of the TCGIS is signed as a passenger loading area during weekday mornings and afternoons.

Van Slyke Avenue is a two-lane, undivided road with a 30-mph speed limit. Sidewalks are on both sides of the road and on-street parking is permitted. The south side of Van Slyke Avenue in front of the TCGIS is signed as a passenger loading area during weekday mornings and afternoons. Van Slyke Avenue becomes Chatsworth Street east of Como Avenue.

Churchill Street, Oxford Street and Argyle Street are local, two-way, undivided roads with 30-mph speed limits. Sidewalks are provided on both sides of these roads and on-street parking is permitted.

The Lexington Parkway/Como Avenue/Horton Avenue and Lexington Parkway/Wynne Avenue/Como Avenue intersections are signalized. The other study intersections are under side street stop sign control (the major road continues without stopping).

Existing traffic control and travel lanes for the study intersections are shown in Figure 2 in the Appendix.

Metro Transit Route 3 runs along Van Slyke Avenue, Como Avenue and Horton Avenue while Route 83 runs along Lexington Parkway and Como Avenue. Route 3 (U of M-Como Avenue-Energy Park Drive-Maryland Avenue) runs with an approximate frequency of five to ten minutes during the weekday rush hours and ten to 30 minutes for the rest of a typical weekday. Route 83 (HarMar Target-Lexington Avenue) has an approximate frequency of 30 minutes during the weekday rush hours and most of a typical weekday.

Traffic Volumes

Intersection video was collected at each study intersection under normal weekday conditions in November of 2018. Using these videos, 48-hour turning movement counts were collected at the study intersections. Counts for the two days were averaged at each location to smooth out any daily irregularities and provide traffic volumes for a “typical day”. The averaged daily volumes are shown in Figure 3 in the Appendix. The full traffic count data, shown in 15-minute intervals, can be seen in the Appendix.

Based on these counts, the overall peak hours in the study area were found to be from 7:30 to 8:30 a.m., 3:00 to 4:00 p.m. and 4:15 to 5:15 p.m. These times encompass the a.m. peak hour, school p.m. peak hour and p.m. peak hour, respectively. Summaries of the peak hour volumes are provided in Figures 4 to 6 in the Appendix.

Field Review

A field review of existing operations was conducted in the study area during the November 2018 data collection via both on-site and video observations of traffic. Key information from these observations is listed below.

AM Peak Hour

- Bus drop-offs occur without issue. Bus unloading areas were free of other vehicles.
- The car drop-offs on the Como Avenue side of the building last from approximately 7:47 to 8:15 a.m. with a few drop-offs as early as 7:35 a.m. The busiest period for car drop-offs was from approximately 8:03 to 8:10 a.m.
- The car drop-offs on the Van Slyke Avenue side of the building last from approximately 7:50 to 8:15 a.m. The busiest period for car drop-offs was approximately 7:57 to 8:07 a.m.
- A few car drop-offs occurred on Churchill Street near both Como Avenue and Van Slyke Avenue. A few car drop-offs also occurred on Como Avenue south of Van Slyke Avenue and Oxford Street south of Como Avenue. Very few car drop-offs occurred on Argyle Street south of Como Avenue.
- Most of the car drop-offs that occurred on Como Avenue were on the north side of the street adjacent to the school, though there were a portion that occurred on the south side of the street. The south side drop-offs increase pedestrian crossings of Como Avenue. Of the car drop-offs on the north side of Como Avenue, most students exited vehicles curbside.
- The westbound vehicle queues on Como Avenue at Lexington Parkway extended beyond Churchill Street from approximately 8:05 to 8:15 a.m. On one of the days of observations, this queue extended to Oxford Street from 8:08 to 8:13 a.m.
- On one of the days of observation, portable pedestrian awareness signs were placed on Como Avenue east of Oxford Street.

School PM Peak Hour

- Car pick-up operations were completed at 3:30 p.m. on both the Como Avenue and Van Slyke Avenue sides of the school.
- Vehicles start parking and waiting to pick-up on Como Avenue at about 2:40 p.m. and on Van Slyke Avenue at about 2:45 p.m.
- The queue for cars waiting to pick-up on the north side of the building extended down Van Slyke Avenue and Horton Avenue all the way to Lexington Avenue. The queue for cars waiting to pick-up on the south side of the building wrapped around Como Avenue to Van Slyke Avenue.
- Bus pick-ups were smooth on one day of observation with no vehicle conflicts in the loading area. On the other day, vehicles were stacked in the loading area causing buses to wait and block the through lane on Van Slyke Avenue before being able to pull curbside.
- Approximately a dozen vehicles do pick-ups on Oxford Street and about a half dozen on both Argyle Street and Churchill Street south of Como Avenue. A larger number occurs

on Churchill Street between Como Avenue and Van Slyke Avenue. A few pick-ups occur in the eastern parking lot off Como Avenue.

- Most of the Como Avenue car pick-ups occur on the north side of Como Avenue with about ten occurring on the south side of Como Avenue.
- There are a large number of pedestrian crossings on Como Avenue during this period. There is no marked crossing area and these crossings are typically unassisted.
- The westbound vehicle queues on Como Avenue at Lexington Parkway extended beyond Churchill Street from approximately 3:26 to 3:30 p.m.
- A moderate number of vehicles use Argyle Street to access the school area.
- There were a number of U-turns made in front of the school, mostly on Como Avenue, during this period. In general, there is a somewhat disordered feel around the school, especially on the Como Avenue side near the curve. With vehicles parked on either sideof Como Avenue and vehicles in the pick-up line on the north side of Como Avenue, that leaves one lane for two-way traffic which includes buses.

On-Street Parking

The on-street parking demand versus supply was monitored during the three peak hours. The percentage of on-street parking occupied in areas around the TCGIS are shown in Table 1. Some of the locations show a range as the number of vehicles parked on-street fluctuated throughout the peak hour. Table 1 also shows the number of parked vehicles during the observation periods.

Table 1 – Occupied On-Street Parking

Location	AM Peak Hour	School PM Peak Hour	PM Peak Hour
Churchill St between Como Ave & Van Slyke Ave	30% - 50% 13-23 cars	40% - 100% 17-45 cars	30% - 40% 14-17 cars
Churchill St south of Como Ave	20% - 25% 9-11 cars	20% - 30% 9-13 cars	25% - 30% 11-13 cars
Como Ave west of Churchill St	0% 0 cars	0% - 10% 0-2 cars	0% 0 cars
Como Ave between Churchill St & Oxford St	70% - 100% 8-11 cars	100% 11 cars	20% - 55% 2-6 cars
Como Ave between Oxford St & Argyle St	15% - 30% 2-4 cars	15% - 100% 2-13 cars	10% - 30% 1-4 cars
Como Ave between Argyle St & Van Slyke Ave	30% - 60% 4-7 cars	25% - 100% 3-12 cars	10% 1 car
Oxford St south of Como Ave	20% - 40% 8-16 cars	25% - 55% 9-21 cars	10% - 15% 4-6 cars
Argyle St south of Como Ave	15% - 20% 6-8 cars	15% - 30% 7-13 cars	10% - 15% 5-7 cars

Table 1 shows the fluctuations in on-street parking demand during the peak hours which gives a sense of school related traffic including staff and parent pick-ups/drop-offs. On-street parking counts were also conducted on a different day in the middle of the day on a school day and late in the evening on a school day to get a sense of parking demand during the day when school is in

session and during the evening when parking demand is driven solely by the residential neighborhood. The difference in these numbers can give a sense of how much on-street parking is utilized by the TCGIS during a school day. These counts are shown in Table 2. These are also visualized in Figure 7 in the Appendix.

Table 2 – Occupied On-Street Parking

Location	12:30 p.m.	9:30 p.m.
Horton Ave between Lexington Pkwy & Van Slyke Ave	2	3
Van Slyke Ave between Churchill St & Como Ave	8	2
Churchill St between Como Ave & Van Slyke Ave	11	9
Churchill St south of Como Ave	9	10
Como Ave west of Churchill St	1	0
Como Ave between Churchill St & Oxford St	9	0
Como Ave between Oxford St & Argyle St	3	1
Como Ave between Argyle St & Van Slyke Ave	2	0
Oxford St south of Como Ave	14	10
Argyle St south of Como Ave	11	10

Comparison to Other Schools

Spack Consulting has reviewed the operations at other schools in Minnesota over the past few years. At the TCGIS, the morning drop-off period lasts approximately 25 minutes and the afternoon pick-up period last approximately 15 minutes. This is very similar to what has been observed at other locations with good operations. For reference, school drop-off periods we have observed are generally around 30 minutes and pick-up periods range from 10 to 30 minutes. From a time-frame perspective, the TCGIS operates well.

Other schools we have observed have larger parking areas or more curb space for their drop-off/pick-up operations. These schools are able to effectively separate bus and car traffic, which is not the case at the TCGIS. The bus loading zones are occasionally in conflict with car loading at the TCGIS.

Around the TCGIS there are a number of intersections with significant pedestrian crossings, but without crossing guards or other protections. Although many students are walked to/from the school by parents/guardians, there are still students walking alone. Other schools Spack Consulting has observed do have crossing guards in place at key locations to improve safety.

Regarding communication with parents/guardians on pick-up/drop-off operations, the TCGIS is stronger in this category than what has been observed at other locations. Pick-up/drop-off policies are easy to find on the school's website and are thorough. The use of signage in pick-up vehicles is well placed and appears to keep the pick-up lines moving at a good pace. While we were not able to specifically evaluate the PikMyKid app, the fact that it exists puts the TCGIS above most schools. This app unquestionably is contributing to the operational efficiency. Having

multiple dedicated staff outside for the pick-up operations also ensures operations continue safely and efficiently.

Operational Analysis

The existing turning movement volumes along with the existing intersection configurations and traffic control were used to develop the average delay per intersection in each study scenario. The delay calculations were done in accordance with the *Highway Capacity Manual, 6th Edition* using the Vistro software package. The full calculations for each study scenario, including Level of Service (LOS) grades and queue lengths, are included in the Appendix.

Chart 1 shows the average peak hour delay per traffic signal controlled intersection for each peak hour. The signal timing for the existing conditions was provided by the City of Saint Paul. The LOS D/E boundary of 55 seconds of delay per vehicle is considered the threshold between acceptable and unacceptable traffic signal operation in Minnesota.

Chart 1 – Peak Hour Delays: Signal Controlled Intersections

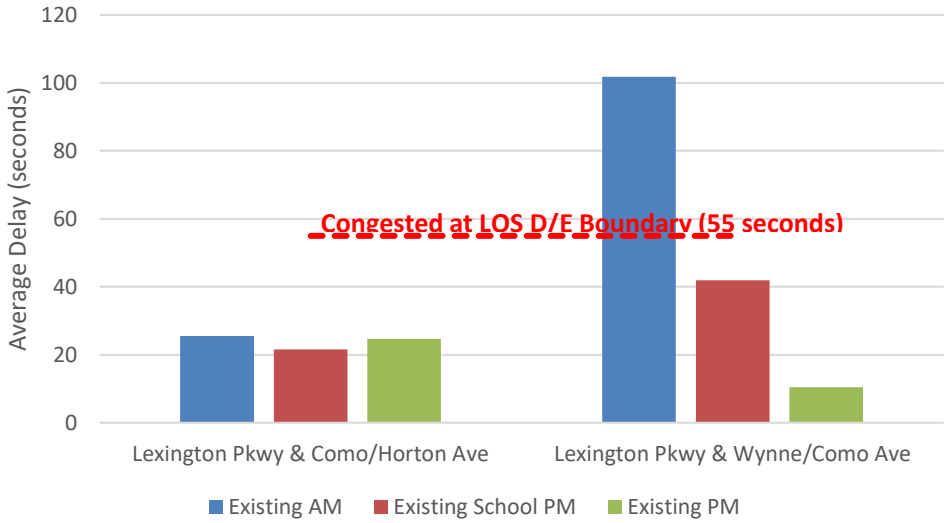
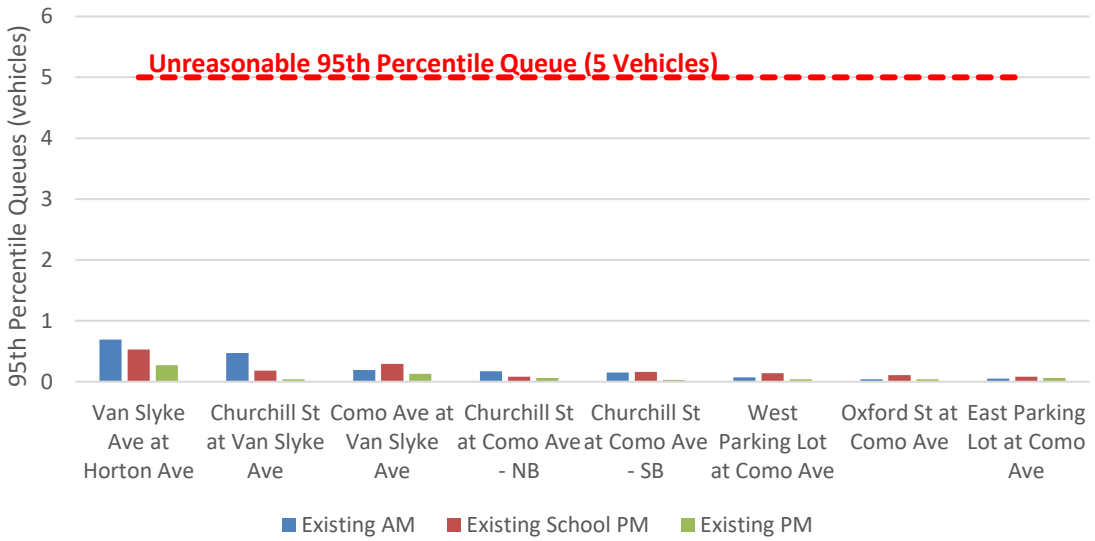


Chart 2 shows the 95th percentile queue lengths on the busiest stop sign controlled approach at intersections with side street stop sign control. Average delays are not shown for intersections with side street stop sign control because the vast majority of vehicles going through the intersection are on the main roadway and have zero delay, which leads to low overall average delays. At side street stop sign controlled approaches to busy roadways, the average delay for all vehicles on the approach often exceeds 60 seconds. This can be the case for a few vehicles waiting at the stop sign where improvements would not be justified for the low traffic volume. Based on our experience, improvements are not warranted at these types of intersections until the 95th percentile queue at a stop sign is in the five to ten vehicle range.

Chart 2 – A.M. Peak Hour Queues: Side Street Stop Sign Controlled Intersections



As shown in Charts 1 and 2, most study intersections and movements are operating acceptably in the existing peak hours. These computer results match the magnitude of delays and vehicle queues observed in the field.

The one intersection operating with higher than desired delays is the Lexington Parkway and Wynne Avenue/Como Avenue intersection in the a.m. peak hour. Specifically, the westbound approach on Como Avenue to the intersection experiences high delays and queues. This result is due to the high concentration of vehicles coming from the school in a relatively short time period. The other three approaches on Lexington Parkway and Wynne Avenue operate acceptably in this peak hour. Having vehicles exiting a school experience significant delay during a peak period is not uncommon and, while not desired by drivers, these significant delays only last for approximately 10 minutes.

Crash History

Crash information for the years 2013 through 2015 (the three most recent years of available data) was retrieved from MnDOT's Minnesota Crash Mapping Analysis Tool (MnCMAT) at each study intersection. Using this crash data as well as the traffic volumes at the study intersections, crash rates were determined at each intersection.

The observed Crash Rate is the number of crashes per million entering vehicles (MEV). This formula uses the total traffic, crashes, and time frame to provide a standard format for comparison between intersections. Although the study intersections can be compared together, a better measure is against the state averages for similar types of intersections (in traffic control type and traffic volume).

Another comparison tool is the Critical Crash Rate, which is a statistically adjusted Crash Rate to account for the random nature of crashes. An observed Crash Rate greater than the critical rate indicates that the intersection operates outside the expected, normal range.

Table 3 summarizes the historic crash data and calculated rates. More detailed crash information is shown in the Appendix.

Table 3 – Intersection Crash Data (2013-2015)

Intersection	Intersection Information			State Average Crash Rate*	Critical Crash Rate*
	Total Crashes	Entering Vehicle Volume	Observed Crash Rate*		
Lexington Pkwy & Como Ave/Horton Ave	12	17,540	0.62	0.52	0.97
Horton Ave & Van Slyke Ave	1	5,352	0.17	0.19	0.73
Como Ave & Chatsworth St	1	1,351	0.68	0.19	1.44
Lexington Pkwy & Wynne Ave/Como Ave	10	14,926	0.61	0.52	1.02
Como Ave & Oxford St	1	841	1.09	0.19	1.89

*Rates are per million entering vehicles.

As shown in Table 3, four of the five study intersections that experienced crashes from 2013 through 2015 have an observed crash rate higher than the state average for their similar type of intersection. All intersections, however, are below the critical crash rate threshold. Based on this result, there is a high probability that the higher than average Crash Rate at some locations is due to the random nature of crashes and not indicative of a systematic safety concern.

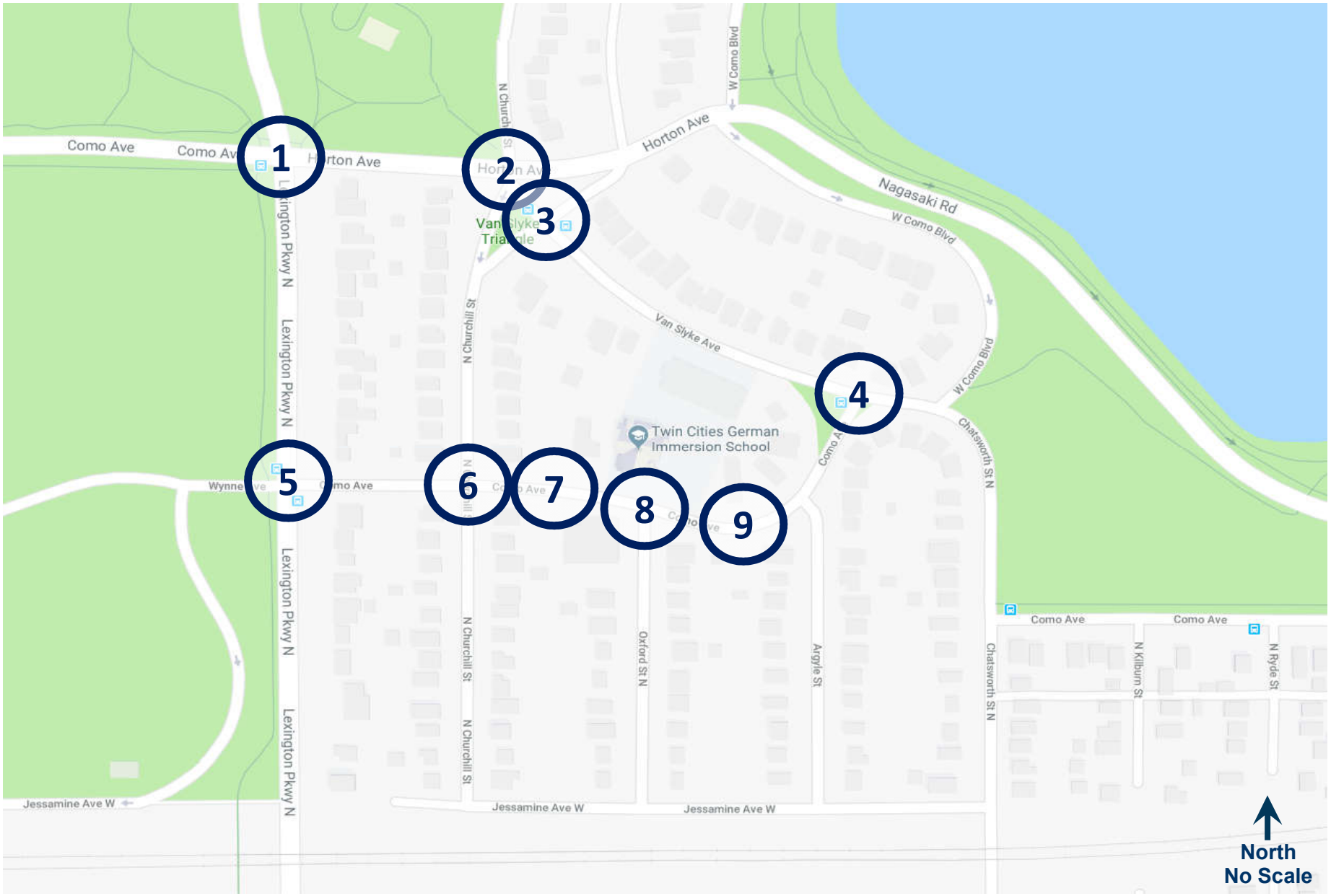
No fatal or serious injury crashes occurred at the study intersections from 2013 through 2015.

Appendix

A. Figures 1-7
B. Traffic Counts
C. Crash Data
D. Capacity Analysis Backup

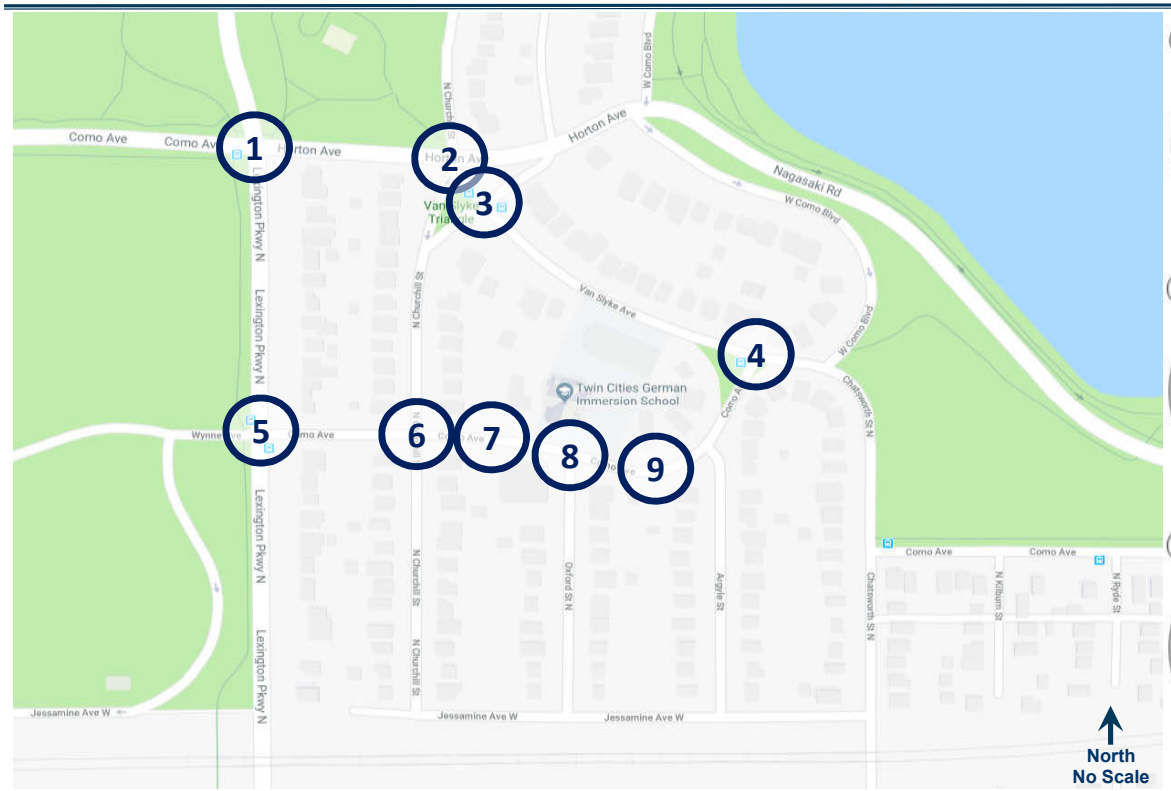
Spack CONSULTING
ENGINEERING TRAFFIC FORWARD

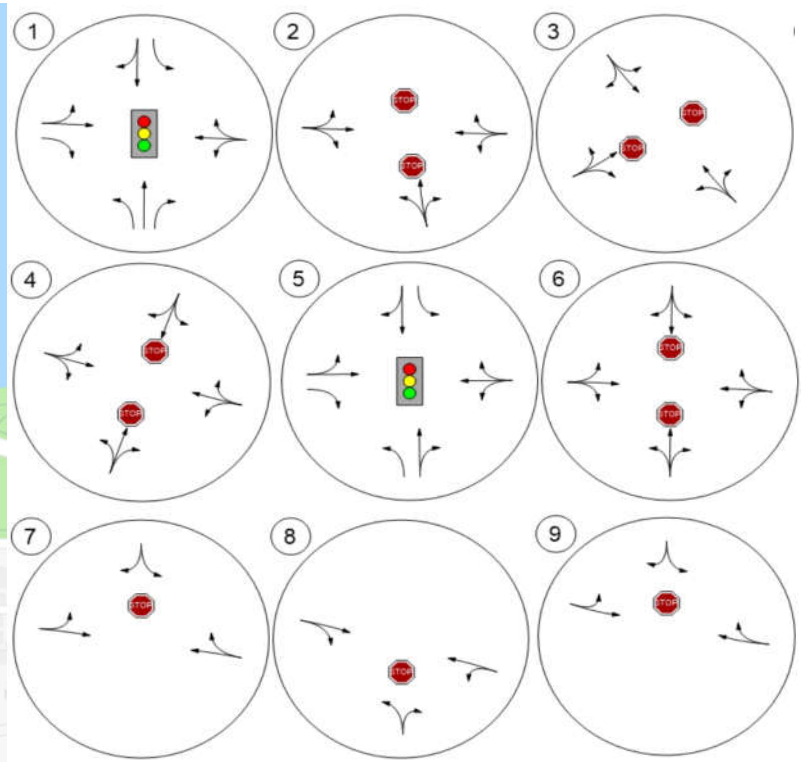
Figure 1
Study Intersections



Spack CONSULTING
ENGINEERING TRAFFIC FORWARD

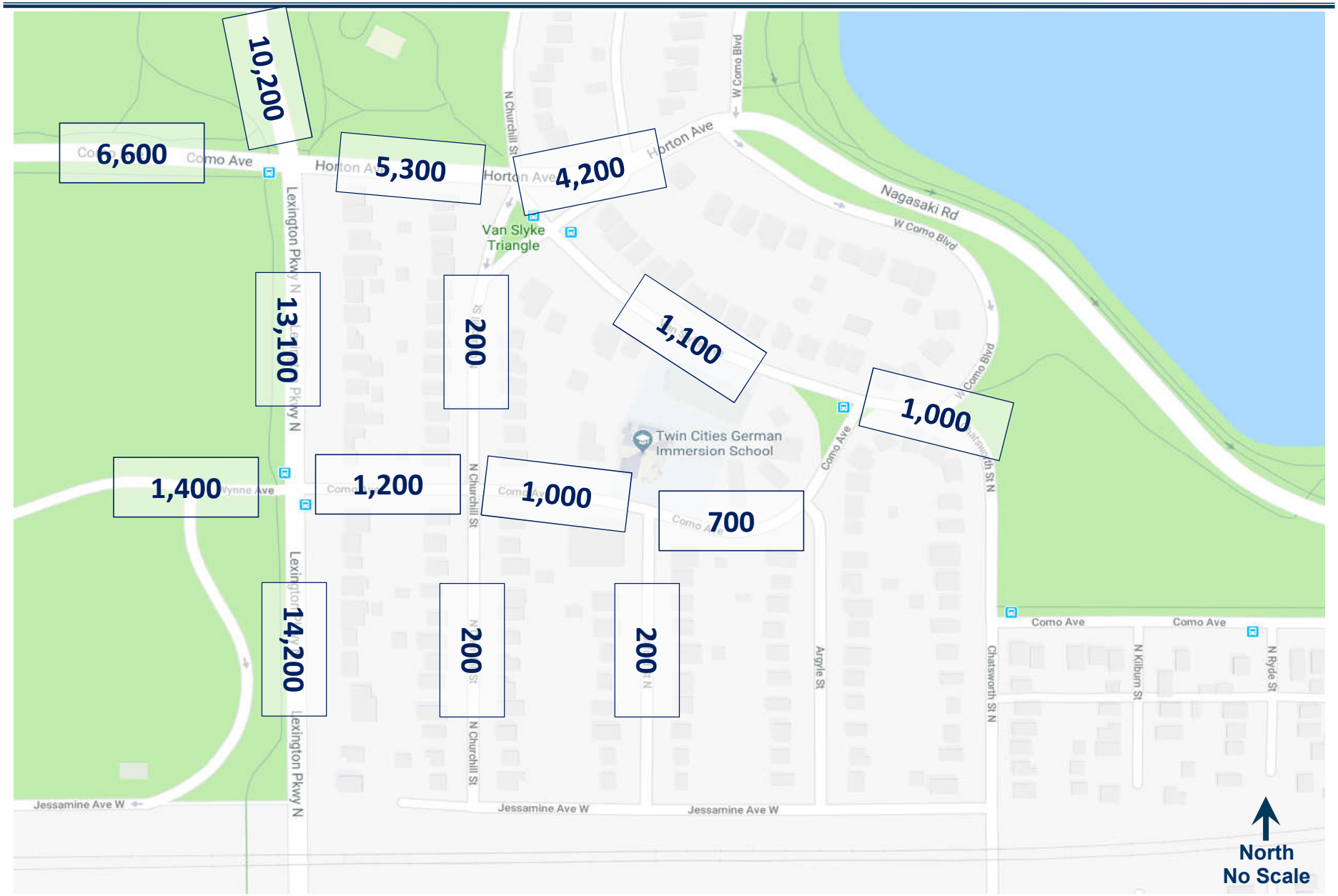
Figure 2
Study Intersection Layouts





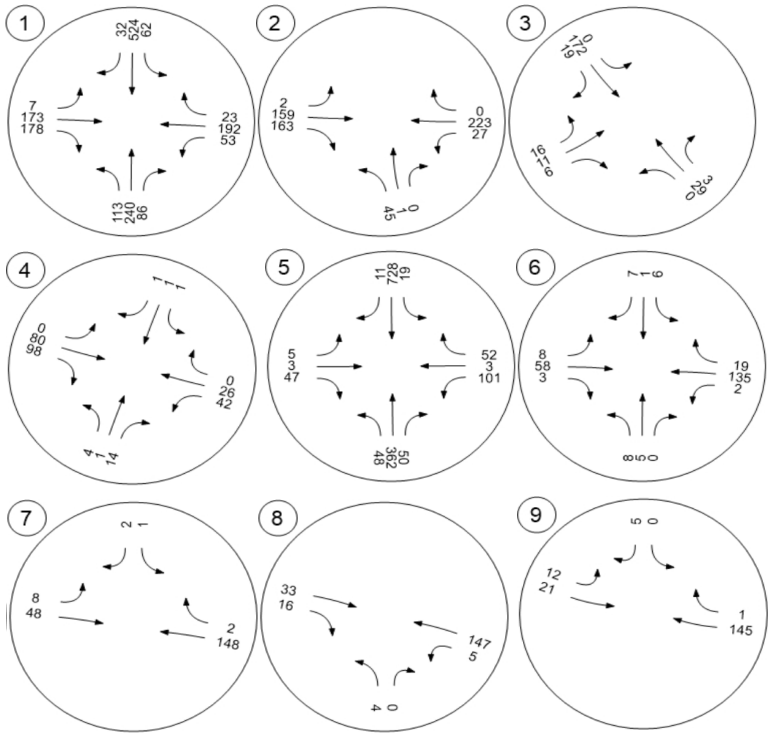
Spack CONSULTING
ENGINEERING TRAFFIC FORWARD

Figure 3
Daily Traffic Volumes



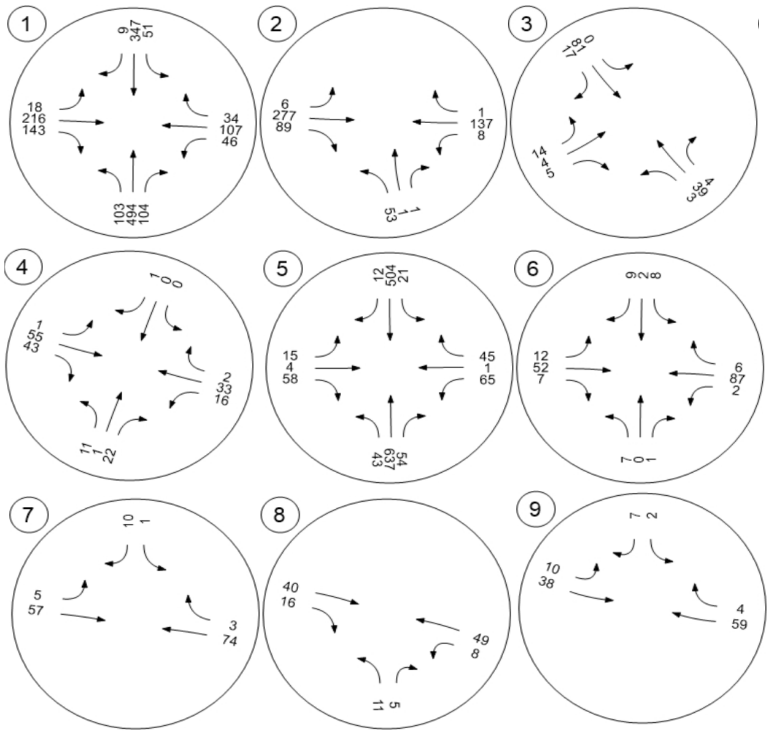
Spack CONSULTING
ENGINEERING TRAFFIC FORWARD

Figure 4
AM Peak Hour Volumes



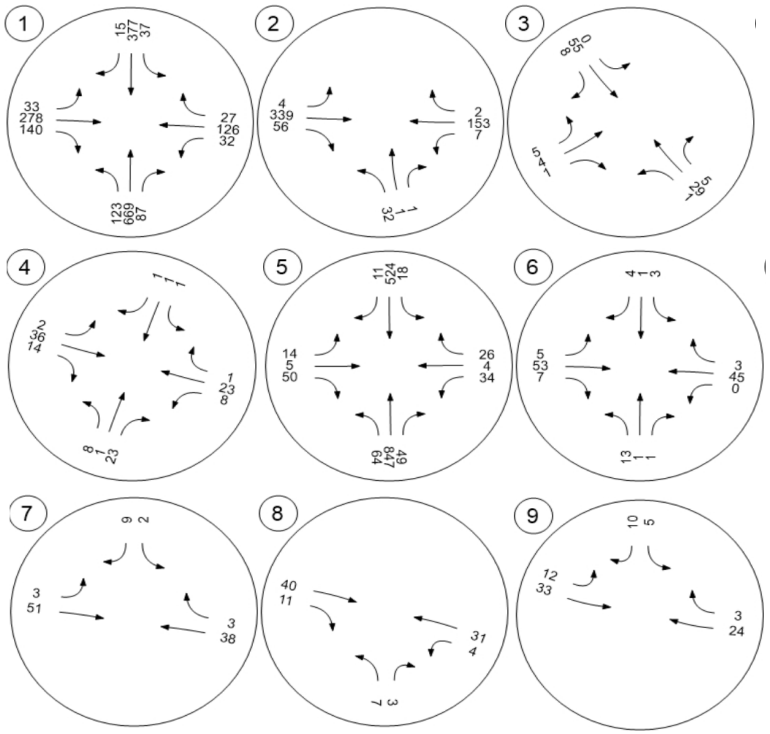
Spack CONSULTING
ENGINEERING TRAFFIC FORWARD

Figure 5
School PM Peak Hour Volumes



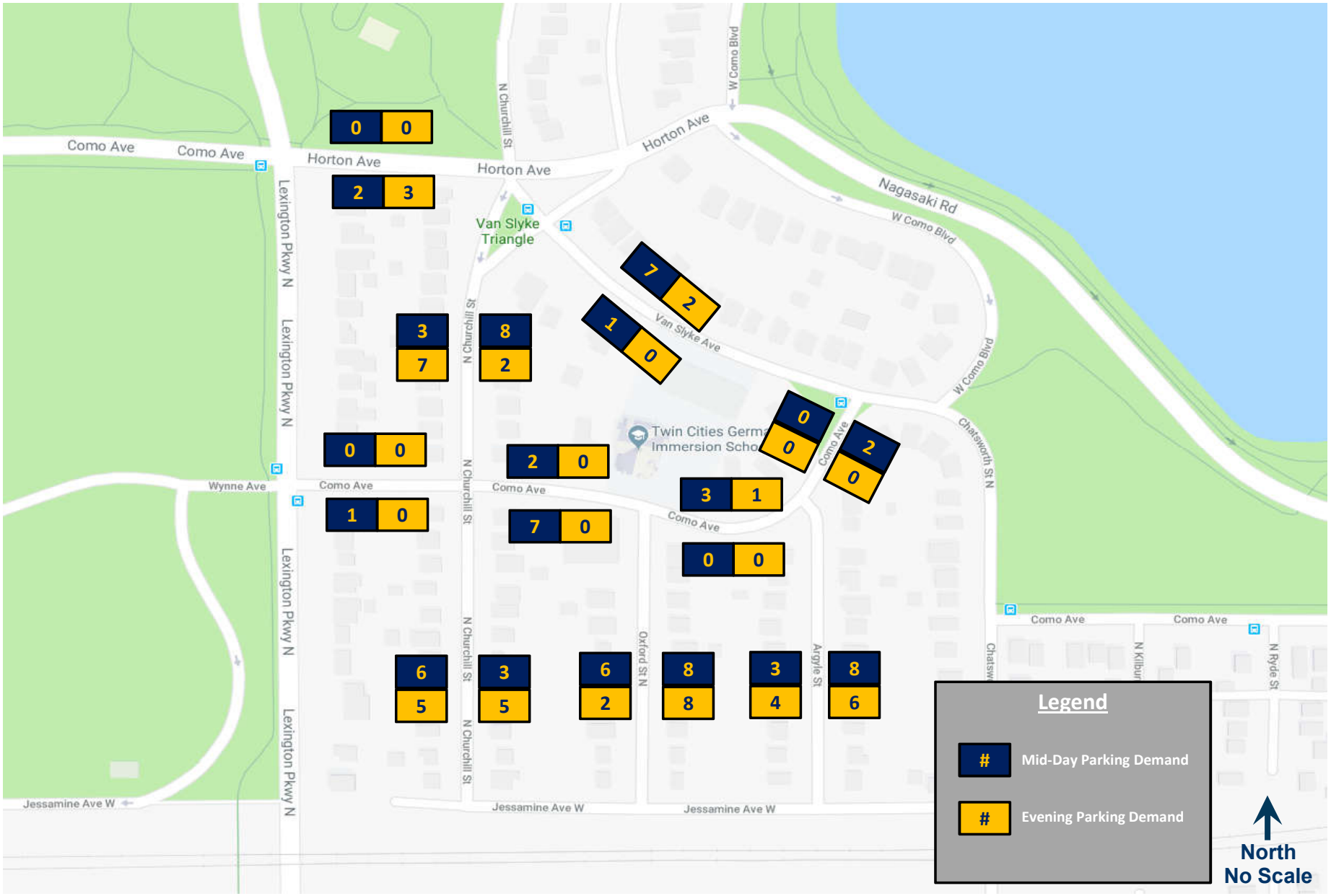
Spack CONSULTING
ENGINEERING TRAFFIC FORWARD

Figure 6
PM Peak Hour Volumes



Spack CONSULTING
ENGINEERING TRAFFIC FORWARD

Figure 7
Mid-Day & Evening On-Street Parking Demand



Level of Service (LOS)

Level of Service (LOS) is a qualitative description, similar to typical school grades, that traffic engineers use to communicate how good or bad traffic operations are on a corridor, intersection, or interchange.

Common Factors

Traffic can be a hard thing to quantify as everyone has a different tolerance for congestion. What seems excessively long to one person may seem good enough for another. These differences are readily apparent when comparing small towns or rural areas, where five cars an hour can be the norm, to big cities or downtowns, where less than hundred cars an hour, even in the middle of night, is rare.

To combat this issue and provide a consistent measuring tool for traffic studies, a "Level of Service" rating was developed. Level of Service ratings are based on the roadway or intersection characteristics and the amount of traffic. Just like grade school, LOS A represents the best traffic operations, where traffic flows freely. LOS F, on the other hand, represents failing operations, where the road or intersection is congested and running beyond maximum capacity. LOS E is typically considered "at capacity" which means the amount of traffic is right at the level the roadway or intersection can adequately accommodate. Using Level of Service letter grades provides an easy way to convey road operations to the general public and has been adopted across the United States.

Common Factors Impacting Level of Service

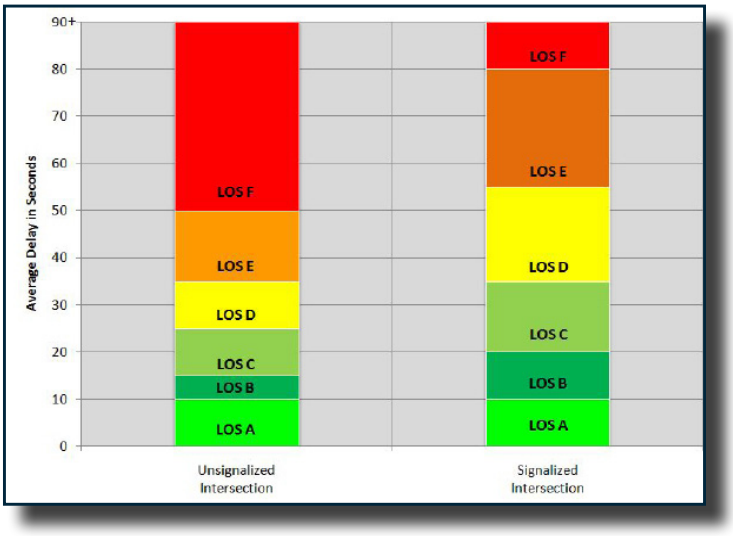
- **Number of Lanes.**
- **Traffic Volumes.**
- **Intersection Control (stop sign, signal, roundabout, interchange.)**
- **Amount of access on a corridor.**
- **Percentage of turning traffic.**
- **Traffic signal cycle length (green time devoted to each approach) and phasing (one green for all approach movements or separate green arrows.)**
- **Percentage of heavy trucks.**
- **Roadway Grades.**
- **Distribution of traffic within a peak hour as well as over the course of a day.**
- **Pedestrian activity.**
- **Bicycle activity.**

Level of Service criteria have been developed for multiple types of traffic operations including:

- Intersections
- Urban Corridors
- Freeways
- Transit Service
- Bicycle Operations
- Pedestrian Operations

The most common LOS criteria used is for car operations at intersections; both signalized and unsignalized. For an intersection Level of Service analysis, average delay for cars travelling through the intersection is used to determine the appropriate grade. A high delay results in a poor LOS rating and equates to poor operations. Similarly, low delay results in a good LOS rating and equates to good or great operations.

LOS can be determined for the intersection as a whole, or for individual movements. It is common during peak periods in major population areas for an intersection to have an acceptable overall LOS rating, but fail to achieve a good grade for individual movements.



Appendix D - Level of Service (LOS)

LOS A

LOS C

LOS D = Acceptable

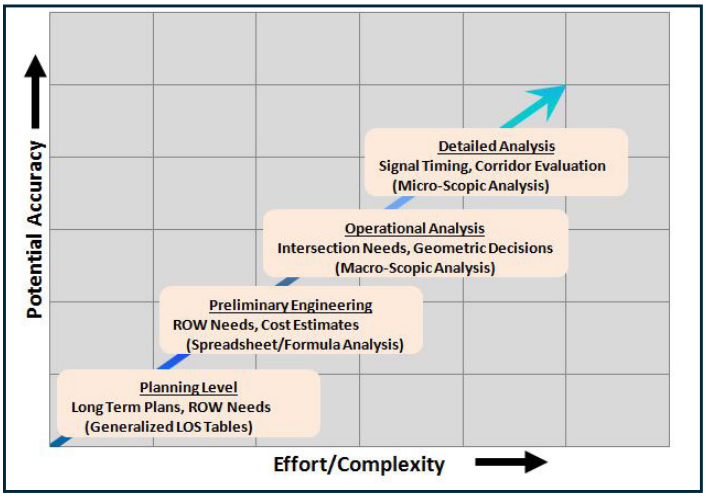
LOS F = Unacceptable

Source: City of San Jose, CA.

Although a Level of Service rating of A represents the best traffic operations, it is not always the most desirable. Providing LOS A for all corridors and all operations at all times would require a significant amount of land to be devoted to the road infrastructure, which makes it extremely costly to build and maintain. During non-peak times, like overnight, much of that infrastructure would sit unused.

On the opposite side of the spectrum, a Level of Service rating of E and F represent traffic operations close to breaking down, or that already have. These ratings mean high delays, long queues, and slow speeds, not to mention driver frustration. Instead of trying to achieve one or the other, government agencies try to strike a balance between providing acceptable operations, neither falling nor flowing too freely. Because of this, **LOS D is typically considered the lowest LOS acceptable by government agencies** and is reflective of a balanced approach between cost and benefit.

There are many tools and guidelines used to determine a roads Level of Service rating. Simple tools like generalized roadway capacities allow for planning-level efforts. While inexpensive and quick to complete, they are not as accurate as other options. More complicated tools, such as micro-simulations, provide more accurate results, but cost more and take more time. It is important to understand the trade-offs between the analysis types as well as the purpose of the study.



Source: Florida Deptarment of Transportation

Resources

- Highway Capacity Manual, fifth edition
- Nation Cooperative Highway Research Program Report 616; Multimodal Level of Service Analysis for Urban Streets
- http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_616.pdf
- Florida Department of Transportation Quality/Level of Service Handbook
- http://www.dot.state.fl.us/planning/systems/programs/sm/los/pdfs/2009FDOTQLOS_Handbook.pdf

About This Brief

Spack Consulting prepared this brief as part of our company's vision to significantly improve the practice of traffic engineering and transportation planning. Transportation professionals from around the world have assisted us in developing this document. We are providing this brief under the Creative Commons Attribution License. Feel free to use-modify-share this guide, but please give us some credit in your document. To request our whole series of Design Briefs and to be included on our distribution list for new materials, please email mspack@spackconsulting.com. And please reach out if you have any comments or questions related to this Design Brief.

Generated with PTV VISTRO
Version 6.00-02

TCGIS

Vistro File: C:\...\TCGIS Vistro.vistro
Report File: C:\...\4 - AM 2023.pdf

Scenario 4 AM 2023
11/29/2018

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Lexington Pkwy & Como Ave/Horton Ave	Signalized	HCM 6th Edition	WB Thru	0.681	28.1	C
2	Horton Ave & Van Slyke Ave	Two-way stop	HCM 6th Edition	NB Left	0.217	20.4	C
3	Van Slyke Ave & Churchill St	Two-way stop	HCM 6th Edition	NEB Thru	0.053	14.7	B
4	Van Slyke Ave & Como Ave	Two-way stop	HCM 6th Edition	SB Thru	0.006	15.9	C
5	Lexington Pkwy & Wynne Ave/Como Ave	Signalized	HCM 6th Edition	WB Left	0.870	130.1	F
6	Churchill St & Como Ave	Two-way stop	HCM 6th Edition	NB Thru	0.023	13.9	B
7	Como Ave & West Parking Lot	Two-way stop	HCM 6th Edition	SB Left	0.004	12.9	B
8	Como Ave & Oxford St	Two-way stop	HCM 6th Edition	NB Left	0.015	11.7	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 1: Lexington Pkwy & Como Ave/Horton Ave

Control Type:	Signalized	Delay (sec / veh):	28.1
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.681

Intersection Setup

Name	Lexington Pkwy			Lexington Pkwy			Como Ave			Horton Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	75.00	100.00	100.00	75.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Pkwy			Lexington Pkwy			Como Ave			Horton Ave		
Base Volume Input [veh/h]	113	240	86	62	524	32	7	173	178	53	192	23
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	6.00	3.00	3.00	3.00	3.00	3.00	3.00	8.00	4.00	4.00	10.00	3.00
Growth Rate	1.03	1.03	1.05	1.05	1.03	1.03	1.03	1.05	1.03	1.05	1.05	1.05
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	45	0	0	8	0	0	46	0	0	6
Total Hourly Volume [veh/h]	116	247	45	65	540	25	7	182	137	56	202	18
Peak Hour Factor	0.8330	0.8330	0.8330	0.8620	0.8620	0.8620	0.8430	0.8430	0.8430	0.8650	0.8650	0.8650
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	35	74	14	19	157	7	2	54	41	16	58	5
Total Analysis Volume [veh/h]	139	297	54	75	626	29	8	216	163	65	234	21
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	8	0	0	0
v_do, Outbound Pedestrian Volume crossing	3			2			3			1		
v_di, Inbound Pedestrian Volume crossing m	3			1			3			2		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix E - Capacity Analysis Backup

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	1	6	0	5	2	0	0	4	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	7	15	0	7	15	0	0	10	0	0	10	0
Maximum Green [s]	25	50	0	12	50	0	0	35	0	0	35	0
Amber [s]	3.0	3.5	0.0	3.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0
All red [s]	1.5	1.5	0.0	1.5	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0
Split [s]	12	36	0	12	36	0	0	32	0	0	32	0
Vehicle Extension [s]	3.5	3.0	0.0	2.3	3.0	0.0	0.0	4.5	0.0	0.0	4.5	0.0
Walk [s]	0	7	0	0	7	0	0	2	0	0	2	0
Pedestrian Clearance [s]	0	12	0	0	12	0	0	15	0	0	15	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.5	3.0	0.0	2.5	3.0	0.0	0.0	7.0	0.0	0.0	7.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	Yes		No	Yes			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	R	C
C, Cycle Length [s]	80	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	9.00	9.00	9.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	0.00	3.00	7.00	7.00	7.00
g_i, Effective Green Time [s]	46	36	36	46	35	20	20	20
g / C, Green / Cycle	0.58	0.45	0.45	0.58	0.44	0.25	0.25	0.25
(v / s)_i Volume / Saturation Flow Rate	0.15	0.16	0.03	0.06	0.36	0.13	0.11	0.28
s, saturation flow rate [veh/h]	946	1855	1577	1196	1841	1763	1496	1136
c, Capacity [veh/h]	442	834	709	709	805	484	371	336
d1, Uniform Delay [s]	12.64	14.42	12.54	7.97	19.68	25.87	25.35	31.80
k, delay calibration	0.13	0.50	0.50	0.50	0.50	0.19	0.19	0.21
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.49	1.19	0.21	0.30	8.86	1.18	1.40	22.00
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.31	0.36	0.08	0.11	0.81	0.46	0.44	0.95
d, Delay for Lane Group [s/veh]	13.13	15.61	12.75	8.27	28.53	27.05	26.75	53.80
Lane Group LOS	B	B	B	A	C	C	C	D
Critical Lane Group	Yes	No	No	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	1.04	3.57	0.56	0.57	11.74	3.71	2.67	8.23
50th-Percentile Queue Length [ft/ln]	26.03	89.27	14.06	14.19	293.49	92.71	66.87	205.82
95th-Percentile Queue Length [veh/ln]	1.87	6.43	1.01	1.02	17.36	6.68	4.81	12.94
95th-Percentile Queue Length [ft/ln]	46.85	160.68	25.30	25.54	433.97	166.88	120.36	323.46

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Movement, Approach, & Intersection Results

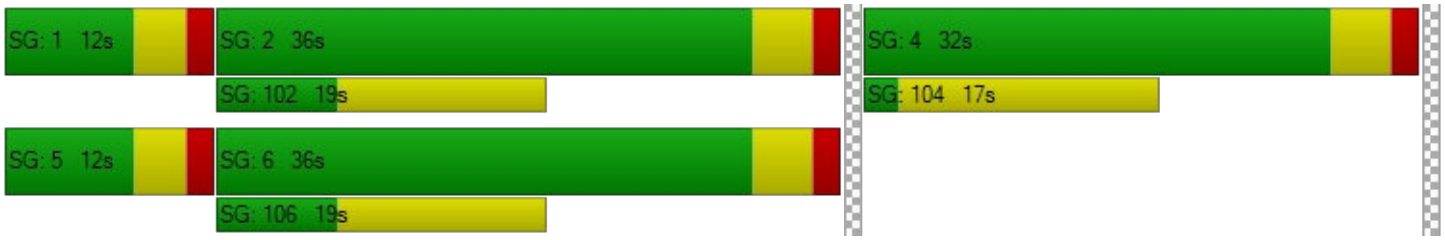
d_M, Delay for Movement [s/veh]	13.13	15.61	12.75	8.27	28.53	28.53	27.05	27.05	26.75	53.80	53.80	53.80
Movement LOS	B	B	B	A	C	C	C	C	C	D	D	D
d_A, Approach Delay [s/veh]	14.59			26.45			26.92			53.80		
Approach LOS	B			C			C			D		
d_I, Intersection Delay [s/veh]	28.07											
Intersection LOS	C											
Intersection V/C	0.681											

Other Modes

g_Walk,mi, Effective Walk Time [s]	6.0	6.0	11.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	2322.36	4658.98	2322.36	4673.24
M_CW, Crosswalk Circulation Area [ft²/ped]	675.57	2284.33	0.00	0.00
d_p, Pedestrian Delay [s]	34.23	34.23	29.76	29.76
l_p,int, Pedestrian LOS Score for Intersection	2.636	2.310	2.365	2.117
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	775	775	675	675
d_b, Bicycle Delay [s]	15.01	15.01	17.56	17.56
l_b,int, Bicycle LOS Score for Intersection	3.590	3.848	2.963	2.786
Bicycle LOS	D	D	C	C

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 2: Horton Ave & Van Slyke Ave

Control Type:	Two-way stop	Delay (sec / veh):	20.4
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.217

Intersection Setup

Name	Van Slyke Ave			Churchill St			Horton Ave			Horton Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Van Slyke Ave			Churchill St			Horton Ave			Horton Ave		
Base Volume Input [veh/h]	45	1	0	0	0	0	2	159	163	27	223	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	13.00	3.00	3.00	2.00	2.00	2.00	3.00	5.00	10.00	5.00	6.00	3.00
Growth Rate	1.09	1.03	1.09	1.00	1.00	1.00	1.03	1.03	1.14	1.14	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	49	1	0	0	0	0	2	164	186	31	230	0
Peak Hour Factor	0.7490	0.7490	0.7490	1.0000	1.0000	1.0000	0.7490	0.7490	0.7490	0.7490	0.7490	0.7490
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	0	0	0	0	0	1	55	62	10	77	0
Total Analysis Volume [veh/h]	65	1	0	0	0	0	3	219	248	41	307	0
Pedestrian Volume [ped/h]	2			6			4			4		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
d_M, Delay for Movement [s/veh]	20.36	19.55	13.58	0.00	0.00	0.00	7.92	0.00	0.00	8.48	0.00	0.00
Movement LOS	C	C	B				A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.82	0.82	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.09
95th-Percentile Queue Length [ft/ln]	20.56	20.56	20.56	0.00	0.00	0.00	0.12	0.12	0.12	2.23	2.23	2.23
d_A, Approach Delay [s/veh]	20.34			0.00			0.05			1.00		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	1.94											
Intersection LOS	C											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 3: Van Slyke Ave & Churchill St

Control Type:	Two-way stop	Delay (sec / veh):	14.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.053

Intersection Setup

Name	Churchill St			Churchill St			Van Slyke Ave			Van Slyke Ave		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Churchill St			Churchill St			Van Slyke Ave			Van Slyke Ave		
Base Volume Input [veh/h]	16	11	6	0	0	0	0	29	3	0	172	19
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	15.00	3.00	2.00	2.00	2.00	17.00	15.00	4.00	30.00	10.00	15.00
Growth Rate	1.09	1.03	1.03	1.00	1.00	1.00	1.03	1.09	1.03	1.03	1.14	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	17	11	6	0	0	0	0	32	3	0	196	21
Peak Hour Factor	0.4700	0.4700	0.4700	1.0000	1.0000	1.0000	0.4700	0.4700	0.4700	0.4700	0.4700	0.4700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	6	3	0	0	0	0	17	2	0	104	11
Total Analysis Volume [veh/h]	36	23	13	0	0	0	0	68	6	0	417	45
Pedestrian Volume [ped/h]	12			3			4			1		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	14.28	14.74	12.46	0.00	0.00	0.00	8.45	0.00	0.00	7.65	0.00	0.00
Movement LOS	B	B	B				A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.54	0.54	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	13.51	13.51	13.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	14.10			0.00			0.00			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	1.67											
Intersection LOS	B											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 4: Van Slyke Ave & Como Ave

Control Type:	Two-way stop	Delay (sec / veh):	15.9
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	Como Ave			Driveway			Van Slyke Ave			Van Slyke Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Como Ave			Driveway			Van Slyke Ave			Van Slyke Ave		
Base Volume Input [veh/h]	4	1	14	1	1	1	0	80	98	42	26	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.00	3.00	5.00	3.00	3.00	3.00	3.00	15.00	3.00	6.00	17.00	3.00
Growth Rate	1.14	1.03	1.14	1.03	1.03	1.03	1.03	1.14	1.14	1.14	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	1	16	1	1	1	0	91	112	48	27	0
Peak Hour Factor	0.4810	0.4810	0.4810	0.4810	0.4810	0.4810	0.4810	0.4810	0.4810	0.4810	0.4810	0.4810
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	1	8	1	1	1	0	47	58	25	14	0
Total Analysis Volume [veh/h]	10	2	33	2	2	2	0	189	233	100	56	0
Pedestrian Volume [ped/h]	4			3			1			1		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.01	0.05	0.01	0.01	0.00	0.00	0.00	0.00	0.09	0.00	0.00
d_M, Delay for Movement [s/veh]	14.62	14.78	10.51	14.81	15.93	8.71	7.35	0.00	0.00	8.57	0.00	0.00
Movement LOS	B	B	B	B	C	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.25	0.25	0.25	0.04	0.04	0.04	0.00	0.00	0.00	0.14	0.14	0.14
95th-Percentile Queue Length [ft/ln]	6.18	6.18	6.18	1.02	1.02	1.02	0.00	0.00	0.00	3.39	3.39	3.39
d_A, Approach Delay [s/veh]	11.61			13.15			0.00			5.49		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	2.32											
Intersection LOS	C											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 5: Lexington Pkwy & Wynne Ave/Como Ave

Control Type:	Signalized	Delay (sec / veh):	130.1
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.870

Intersection Setup

Name	Lexington Pkwy			Lexington Pkwy			Wynne Ave			Como Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Pkwy			Lexington Pkwy			Wynne Ave			Como Ave		
Base Volume Input [veh/h]	48	362	50	19	728	11	5	3	47	101	3	52
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	7.00	3.00	8.00	3.00	3.00	10.00	3.00
Growth Rate	1.03	1.03	1.14	1.14	1.03	1.03	1.03	1.14	1.03	1.14	1.14	1.14
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	14	0	0	3	0	0	24	0	0	15
Total Hourly Volume [veh/h]	49	373	43	22	750	8	5	3	24	115	3	44
Peak Hour Factor	0.8830	0.8830	0.8830	0.9240	0.9240	0.9240	0.8180	0.8180	0.8180	0.4920	0.4920	0.4920
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	14	106	12	6	203	2	2	1	7	58	2	22
Total Analysis Volume [veh/h]	55	422	49	24	812	9	6	4	29	234	6	89
Presence of On-Street Parking	No		No	No		No	No		No	No		Yes
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	1
Local Bus Stopping Rate [/h]	0	0	2	0	0	2	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3			2			4			2		
v_di, Inbound Pedestrian Volume crossing m	4			2			3			2		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix E - Capacity Analysis Backup

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	1	6	0	0	2	0	0	4	0	0	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	7	20	0	0	20	0	0	10	0	0	10	0
Maximum Green [s]	20	50	0	0	50	0	0	35	0	0	35	0
Amber [s]	3.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0
All red [s]	1.5	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0
Split [s]	15	38	0	0	38	0	0	27	0	0	27	0
Vehicle Extension [s]	3.5	3.0	0.0	0.0	3.0	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Walk [s]	0	7	0	0	7	0	0	2	0	0	2	0
Pedestrian Clearance [s]	0	11	0	0	11	0	0	13	0	0	13	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.5	3.0	0.0	0.0	3.0	0.0	0.0	7.0	0.0	0.0	7.0	0.0
Minimum Recall	No	No			No			No			No	
Maximum Recall	No	No			No			No			No	
Pedestrian Recall	No	Yes			Yes			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Lane Group Calculations

Lane Group	L	C	L	C	C	R	C
C, Cycle Length [s]	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	9.00	9.00	9.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	2.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	3.00	7.00	7.00	7.00
g_i, Effective Green Time [s]	60	60	50	50	6	6	6
g / C, Green / Cycle	0.75	0.75	0.63	0.63	0.08	0.08	0.08
(v / s)_i Volume / Saturation Flow Rate	0.07	0.26	0.03	0.45	0.01	0.02	0.41
s, saturation flow rate [veh/h]	799	1807	915	1837	1640	1509	798
c, Capacity [veh/h]	522	1343	551	1148	207	124	142
d1, Uniform Delay [s]	6.96	3.57	10.11	10.17	33.90	34.34	38.99
k, delay calibration	0.13	0.50	0.50	0.50	0.08	0.08	0.29
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.11	0.72	0.15	3.82	0.07	0.71	601.60
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.11	0.35	0.04	0.72	0.05	0.23	2.31
d, Delay for Lane Group [s/veh]	7.06	4.30	10.25	14.00	33.97	35.05	640.59
Lane Group LOS	A	A	B	B	C	D	F
Critical Lane Group	Yes	No	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.17	2.04	0.22	9.24	0.18	0.54	26.73
50th-Percentile Queue Length [ft/ln]	4.33	51.00	5.55	230.95	4.52	13.58	668.16
95th-Percentile Queue Length [veh/ln]	0.31	3.67	0.40	14.22	0.33	0.98	42.47
95th-Percentile Queue Length [ft/ln]	7.79	91.80	10.00	355.57	8.13	24.45	1061.86

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Movement, Approach, & Intersection Results

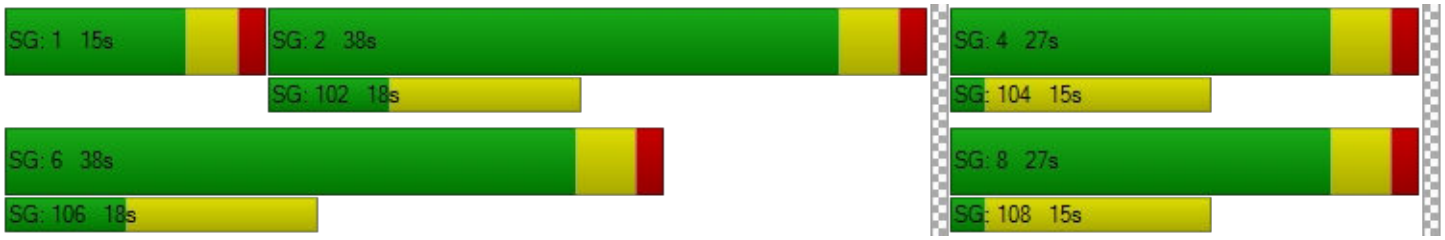
d_M, Delay for Movement [s/veh]	7.06	4.30	4.30	10.25	14.00	14.00	33.97	33.97	35.05	640.59	640.59	640.59
Movement LOS	A	A	A	B	B	B	C	C	D	F	F	F
d_A, Approach Delay [s/veh]	4.59			13.89			34.77			640.59		
Approach LOS	A			B			C			F		
d_I, Intersection Delay [s/veh]	130.11											
Intersection LOS	F											
Intersection V/C	0.870											

Other Modes

g_Walk,mi, Effective Walk Time [s]	6.0	6.0	11.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	1990.59	3494.23	1984.48	3494.23
M_CW, Crosswalk Circulation Area [ft²/ped]	291.61	1234.80	0.00	0.00
d_p, Pedestrian Delay [s]	34.23	34.23	29.76	29.76
l_p,int, Pedestrian LOS Score for Intersection	2.825	2.479	2.063	1.976
Crosswalk LOS	C	B	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	825	825	550	550
d_b, Bicycle Delay [s]	13.81	13.81	21.03	21.03
l_b,int, Bicycle LOS Score for Intersection	3.292	3.724	2.429	2.586
Bicycle LOS	C	D	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 6: Churchill St & Como Ave

Control Type:	Two-way stop	Delay (sec / veh):	13.9
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.023

Intersection Setup

Name	Churchill St			Churchill St			Como Ave			Como Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Churchill St			Churchill St			Como Ave			Como Ave		
Base Volume Input [veh/h]	8	5	0	6	1	7	8	58	3	2	135	19
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	15.00	10.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.03	1.03	1.03	1.03	1.09	1.09	1.14	1.09	1.03	1.14	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	9	5	0	6	1	8	9	66	3	2	154	20
Peak Hour Factor	0.4960	0.4960	0.4960	0.4960	0.4960	0.4960	0.4960	0.4960	0.4960	0.4960	0.4960	0.4960
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	3	0	3	1	4	5	33	2	1	78	10
Total Analysis Volume [veh/h]	18	10	0	12	2	16	18	133	6	4	310	40
Pedestrian Volume [ped/h]	6			6			1			2		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.02	0.00	0.03	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.78	13.90	9.59	13.49	13.54	10.75	8.17	0.00	0.00	7.54	0.00	0.00
Movement LOS	B	B	A	B	B	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.21	0.21	0.21	0.18	0.18	0.18	0.02	0.02	0.02	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	5.13	5.13	5.13	4.38	4.38	4.38	0.59	0.59	0.59	0.11	0.11	0.11
d_A, Approach Delay [s/veh]	13.82			12.03			0.94			0.09		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	1.63											
Intersection LOS	B											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 7: Como Ave & West Parking Lot

Control Type:	Two-way stop	Delay (sec / veh):	12.9
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	West Parking Lot		Como Ave		Como Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	West Parking Lot		Como Ave		Como Ave	
Base Volume Input [veh/h]	1	2	8	48	148	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.11	1.11	1.11	1.14	1.14	1.11
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	5	12	-12	-5	1
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1	7	21	43	164	3
Peak Hour Factor	0.4880	0.4880	0.4880	0.4880	0.4880	0.4880
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	4	11	22	84	2
Total Analysis Volume [veh/h]	2	14	43	88	336	6
Pedestrian Volume [ped/h]	27		2		4	

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.02	0.04	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	12.87	10.62	8.23	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.08	0.08	0.06	0.06	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.96	1.96	1.38	1.38	0.00	0.00
d_A, Approach Delay [s/veh]	10.90		2.70		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.08					
Intersection LOS	B					

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 8: Como Ave & Oxford St

Control Type:	Two-way stop	Delay (sec / veh):	11.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.015

Intersection Setup

Name	Oxford St		Como Ave		Como Ave	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Oxford St		Como Ave		Como Ave	
Base Volume Input [veh/h]	4	0	33	16	5	147
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.14	1.09	1.09	1.14
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	-12	0	0	-4
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	0	26	17	5	164
Peak Hour Factor	0.4790	0.4790	0.4790	0.4790	0.4790	0.4790
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	14	9	3	86
Total Analysis Volume [veh/h]	8	0	54	35	10	342
Pedestrian Volume [ped/h]	1		23		9	

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

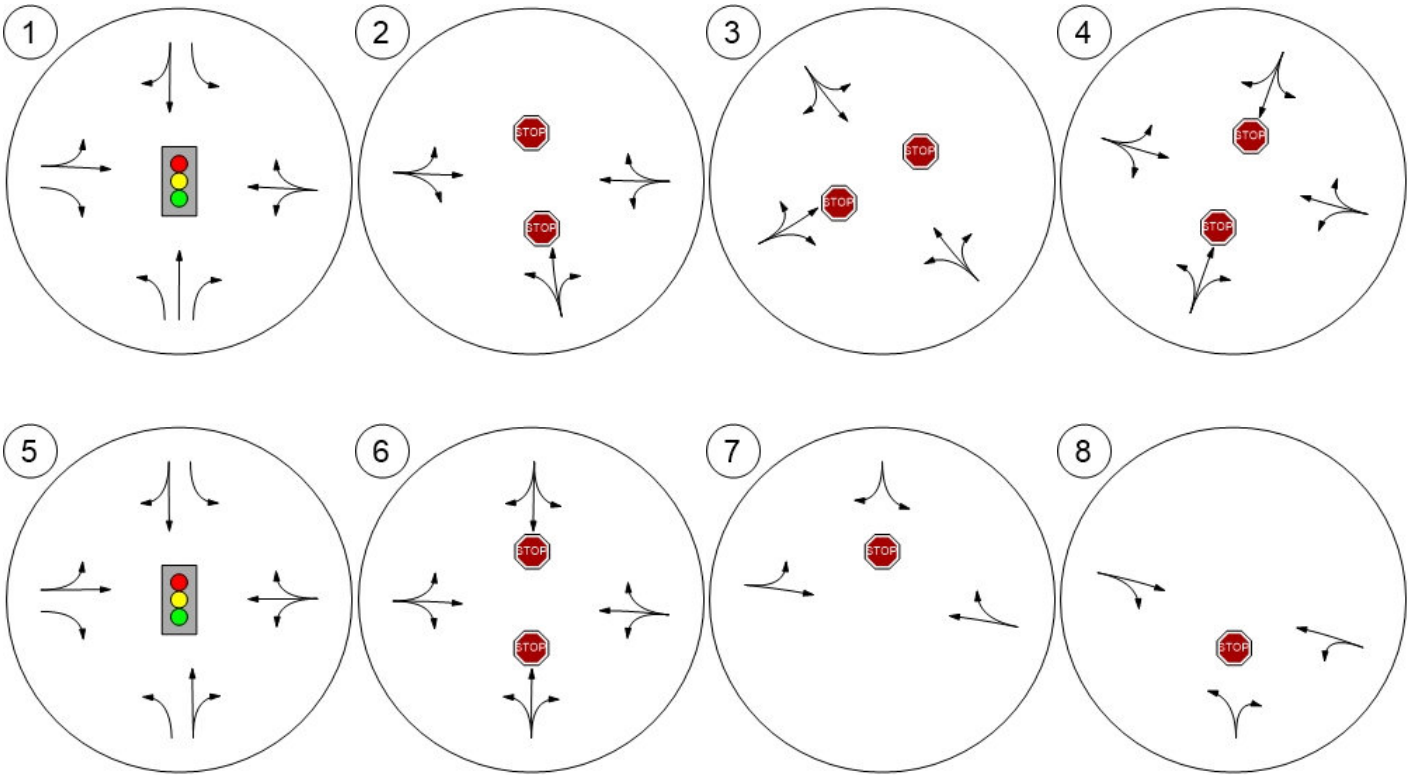
Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

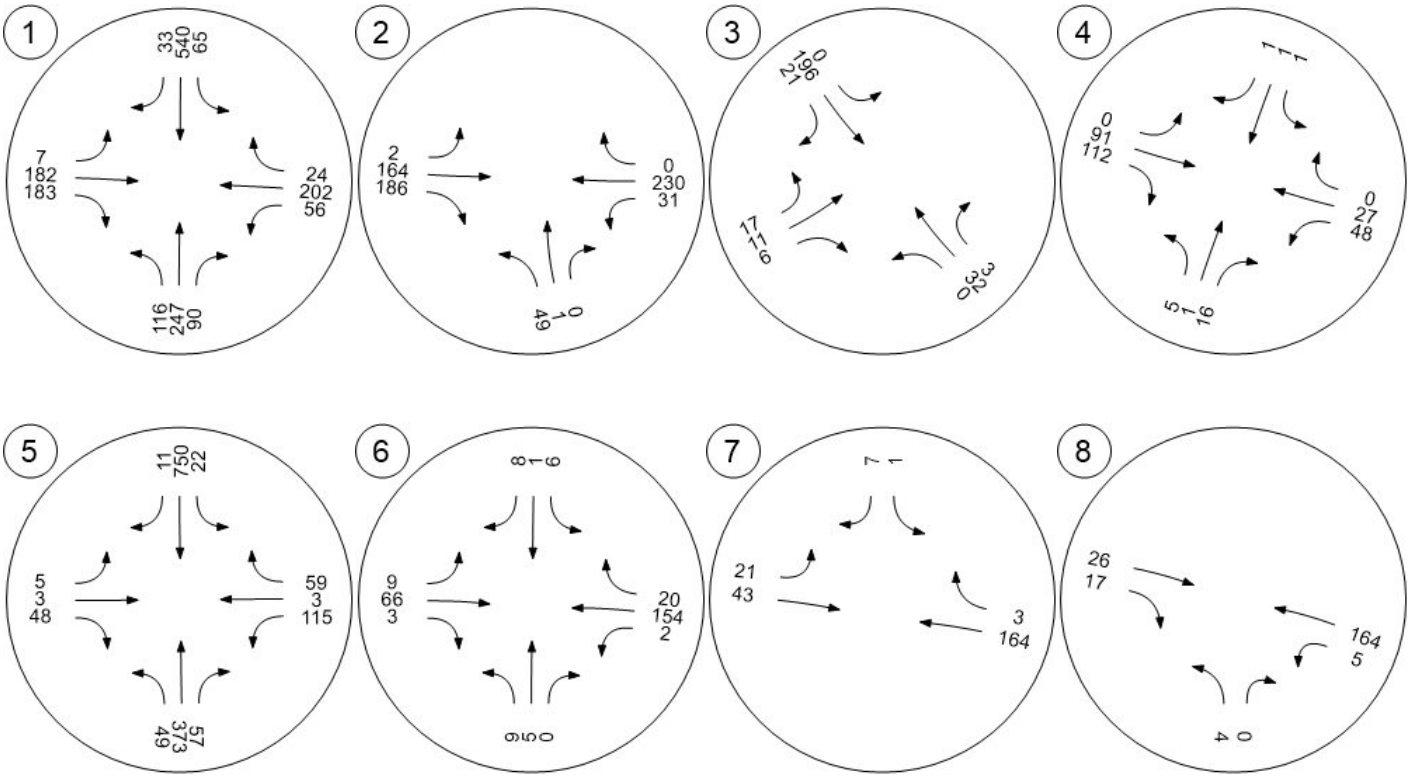
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	11.74	8.83	0.00	0.00	7.42	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.04	0.04	0.00	0.00	0.01	0.01
95th-Percentile Queue Length [ft/ln]	1.12	1.12	0.00	0.00	0.25	0.25
d_A, Approach Delay [s/veh]	11.74		0.00		0.21	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.37					
Intersection LOS	B					

Lane Configuration and Traffic Control



Traffic Volume - Future Total Volume



TCGIS

Vistro File: C:\...\TCGIS Vistro.vistro
Report File: C:\...\5 - School PM 2023.pdf

Scenario 5 School PM 2023
11/29/2018

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Lexington Pkwy & Como Ave/Horton Ave	Signalized	HCM 6th Edition	WB Thru	0.558	22.2	C
2	Horton Ave & Van Slyke Ave	Two-way stop	HCM 6th Edition	NB Left	0.169	15.9	C
3	Van Slyke Ave & Churchill St	Two-way stop	HCM 6th Edition	NEB Thru	0.012	11.4	B
4	Van Slyke Ave & Como Ave	Two-way stop	HCM 6th Edition	NB Thru	0.004	12.1	B
5	Lexington Pkwy & Wynne Ave/Como Ave	Signalized	HCM 6th Edition	WB Left	0.797	60.2	E
6	Churchill St & Como Ave	Two-way stop	HCM 6th Edition	SB Thru	0.008	12.2	B
7	Como Ave & West Parking Lot	Two-way stop	HCM 6th Edition	SB Left	0.012	12.4	B
8	Como Ave & Oxford St	Two-way stop	HCM 6th Edition	NB Left	0.029	10.2	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 1: Lexington Pkwy & Como Ave/Horton Ave

Control Type:	Signalized	Delay (sec / veh):	22.2
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.558

Intersection Setup

Name	Lexington Pkwy			Lexington Pkwy			Como Ave			Horton Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	75.00	100.00	100.00	75.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Pkwy			Lexington Pkwy			Como Ave			Horton Ave		
Base Volume Input [veh/h]	103	494	104	51	347	9	18	216	143	46	107	34
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	6.00	3.00	3.00	3.00	3.00	3.00	3.00	8.00	4.00	4.00	10.00	3.00
Growth Rate	1.03	1.03	1.05	1.05	1.03	1.03	1.03	1.05	1.03	1.05	1.05	1.05
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	52	0	0	2	0	0	36	0	0	9
Total Hourly Volume [veh/h]	106	509	57	54	357	7	19	227	111	48	112	27
Peak Hour Factor	0.8940	0.8940	0.8940	0.9100	0.9100	0.9100	0.9090	0.9090	0.9090	0.8860	0.8860	0.8860
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	30	142	16	15	98	2	5	62	31	14	32	8
Total Analysis Volume [veh/h]	119	569	64	59	392	8	21	250	122	54	126	30
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	8	0	0	0
v_do, Outbound Pedestrian Volume crossing	4			6			9			3		
v_di, Inbound Pedestrian Volume crossing m	9			3			4			6		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	1	6	0	5	2	0	0	4	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	7	15	0	7	15	0	0	10	0	0	10	0
Maximum Green [s]	25	50	0	12	50	0	0	35	0	0	35	0
Amber [s]	3.0	3.5	0.0	3.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0
All red [s]	1.5	1.5	0.0	1.5	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0
Split [s]	12	36	0	12	36	0	0	32	0	0	32	0
Vehicle Extension [s]	3.5	3.0	0.0	2.3	3.0	0.0	0.0	4.5	0.0	0.0	4.5	0.0
Walk [s]	0	7	0	0	7	0	0	2	0	0	2	0
Pedestrian Clearance [s]	0	12	0	0	12	0	0	15	0	0	15	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.5	3.0	0.0	2.5	3.0	0.0	0.0	7.0	0.0	0.0	7.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	Yes		No	Yes			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	R	C
C, Cycle Length [s]	80	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	9.00	9.00	9.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	0.00	3.00	7.00	7.00	7.00
g_i, Effective Green Time [s]	48	38	38	48	37	19	19	19
g / C, Green / Cycle	0.59	0.47	0.47	0.59	0.46	0.23	0.23	0.23
(v / s)_i Volume / Saturation Flow Rate	0.11	0.31	0.04	0.06	0.22	0.16	0.08	0.23
s, saturation flow rate [veh/h]	1101	1855	1577	987	1848	1706	1472	895
c, Capacity [veh/h]	640	876	745	523	840	445	342	264
d1, Uniform Delay [s]	8.21	16.13	11.65	9.25	15.26	27.95	25.76	30.58
k, delay calibration	0.13	0.50	0.50	0.50	0.50	0.19	0.19	0.19
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.17	3.72	0.23	0.44	1.93	2.31	1.08	8.92
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.19	0.65	0.09	0.11	0.48	0.61	0.36	0.79
d, Delay for Lane Group [s/veh]	8.38	19.84	11.88	9.69	17.20	30.26	26.84	39.51
Lane Group LOS	A	B	B	A	B	C	C	D
Critical Lane Group	No	Yes	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.82	8.17	0.64	0.44	5.17	4.84	1.99	4.64
50th-Percentile Queue Length [ft/ln]	20.44	204.21	15.93	10.99	129.24	120.91	49.76	115.92
95th-Percentile Queue Length [veh/ln]	1.47	12.86	1.15	0.79	8.90	8.44	3.58	8.17
95th-Percentile Queue Length [ft/ln]	36.79	321.38	28.68	19.78	222.46	211.07	89.58	204.20

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Movement, Approach, & Intersection Results

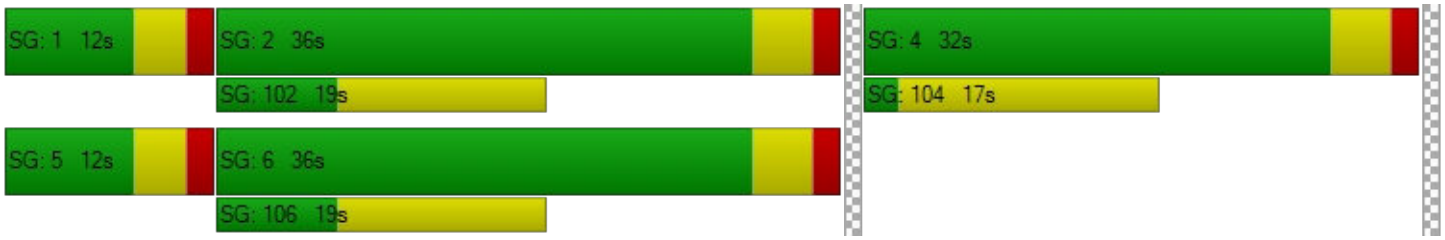
d_M, Delay for Movement [s/veh]	8.38	19.84	11.88	9.69	17.20	17.20	30.26	30.26	26.84	39.51	39.51	39.51
Movement LOS	A	B	B	A	B	B	C	C	C	D	D	D
d_A, Approach Delay [s/veh]	17.35			16.23			29.20			39.51		
Approach LOS	B			B			C			D		
d_I, Intersection Delay [s/veh]	22.20											
Intersection LOS	C											
Intersection V/C	0.558											

Other Modes

g_Walk,mi, Effective Walk Time [s]	6.0	6.0	11.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	1068.57	1533.98	1052.11	1548.24
M_CW, Crosswalk Circulation Area [ft²/ped]	369.65	723.02	0.00	0.00
d_p, Pedestrian Delay [s]	34.23	34.23	29.76	29.76
l_p,int, Pedestrian LOS Score for Intersection	2.624	2.326	2.288	2.077
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	775	775	675	675
d_b, Bicycle Delay [s]	15.01	15.01	17.56	17.56
l_b,int, Bicycle LOS Score for Intersection	4.034	3.391	2.956	2.609
Bicycle LOS	D	C	C	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 2: Horton Ave & Van Slyke Ave

Control Type:	Two-way stop	Delay (sec / veh):	15.9
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.169

Intersection Setup

Name	Van Slyke Ave			Churchill St			Horton Ave			Horton Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Van Slyke Ave			Churchill St			Horton Ave			Horton Ave		
Base Volume Input [veh/h]	53	1	1	0	0	0	6	277	89	8	137	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	13.00	3.00	3.00	2.00	2.00	2.00	3.00	5.00	10.00	5.00	6.00	3.00
Growth Rate	1.09	1.03	1.09	1.00	1.00	1.00	1.03	1.03	1.14	1.14	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	58	1	1	0	0	0	6	285	101	9	141	1
Peak Hour Factor	0.8720	0.8720	0.8720	1.0000	1.0000	1.0000	0.8720	0.8720	0.8720	0.8720	0.8720	0.8720
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	0	0	0	0	0	2	82	29	3	40	0
Total Analysis Volume [veh/h]	67	1	1	0	0	0	7	327	116	10	162	1
Pedestrian Volume [ped/h]	2			3			3			2		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	15.94	15.62	12.37	0.00	0.00	0.00	7.58	0.00	0.00	8.31	0.00	0.00
Movement LOS	C	C	B				A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.62	0.62	0.62	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02
95th-Percentile Queue Length [ft/ln]	15.43	15.43	15.43	0.00	0.00	0.00	0.32	0.32	0.32	0.62	0.62	0.62
d_A, Approach Delay [s/veh]	15.89			0.00			0.12			0.48		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	1.78											
Intersection LOS	C											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 3: Van Slyke Ave & Churchill St

Control Type:	Two-way stop	Delay (sec / veh):	11.4
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.012

Intersection Setup

Name	Churchill St			Churchill St			Van Slyke Ave			Van Slyke Ave		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Churchill St			Churchill St			Van Slyke Ave			Van Slyke Ave		
Base Volume Input [veh/h]	14	4	5	0	0	0	3	39	4	0	81	17
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	15.00	3.00	2.00	2.00	2.00	17.00	15.00	4.00	30.00	10.00	15.00
Growth Rate	1.09	1.03	1.03	1.00	1.00	1.00	1.03	1.09	1.03	1.03	1.14	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	15	4	5	0	0	0	3	43	4	0	92	19
Peak Hour Factor	0.5540	0.5540	0.5540	1.0000	1.0000	1.0000	0.5540	0.5540	0.5540	0.5540	0.5540	0.5540
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	2	2	0	0	0	1	19	2	0	42	9
Total Analysis Volume [veh/h]	27	7	9	0	0	0	5	78	7	0	166	34
Pedestrian Volume [ped/h]	6			1			3			0		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.78	11.39	9.64	0.00	0.00	0.00	7.76	0.00	0.00	7.67	0.00	0.00
Movement LOS	B	B	A				A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.20	0.20	0.20	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	5.04	5.04	5.04	0.00	0.00	0.00	0.17	0.17	0.17	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.64			0.00			0.43			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	1.49											
Intersection LOS	B											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 4: Van Slyke Ave & Como Ave

Control Type:	Two-way stop	Delay (sec / veh):	12.1
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	Como Ave			Driveway			Van Slyke Ave			Van Slyke Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Como Ave			Driveway			Van Slyke Ave			Van Slyke Ave		
Base Volume Input [veh/h]	11	1	22	0	0	1	1	55	43	16	33	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.00	3.00	5.00	3.00	3.00	3.00	3.00	15.00	3.00	6.00	17.00	3.00
Growth Rate	1.14	1.03	1.14	1.03	1.03	1.03	1.03	1.14	1.14	1.14	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	1	25	0	0	1	1	63	49	18	34	2
Peak Hour Factor	0.5220	0.5220	0.5220	0.5220	0.5220	0.5220	0.5220	0.5220	0.5220	0.5220	0.5220	0.5220
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	0	12	0	0	0	0	30	23	9	16	1
Total Analysis Volume [veh/h]	25	2	48	0	0	2	2	121	94	34	65	4
Pedestrian Volume [ped/h]	22			1			1			4		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
d_M, Delay for Movement [s/veh]	11.68	12.05	9.98	11.42	11.86	8.65	7.37	0.00	0.00	7.89	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.35	0.35	0.35	0.01	0.01	0.01	0.00	0.00	0.00	0.04	0.04	0.04
95th-Percentile Queue Length [ft/ln]	8.72	8.72	8.72	0.15	0.15	0.15	0.05	0.05	0.05	1.07	1.07	1.07
d_A, Approach Delay [s/veh]	10.60			8.65			0.07			2.60		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	2.76											
Intersection LOS	B											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 5: Lexington Pkwy & Wynne Ave/Como Ave

Control Type:	Signalized	Delay (sec / veh):	60.2
Analysis Method:	HCM 6th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.797

Intersection Setup

Name	Lexington Pkwy			Lexington Pkwy			Wynne Ave			Como Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Pkwy			Lexington Pkwy			Wynne Ave			Como Ave		
Base Volume Input [veh/h]	43	637	54	21	504	12	15	4	58	65	1	45
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	7.00	3.00	8.00	3.00	3.00	10.00	3.00
Growth Rate	1.03	1.03	1.14	1.14	1.03	1.03	1.03	1.14	1.03	1.14	1.14	1.14
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	14	0	0	3	0	0	29	0	0	23
Total Hourly Volume [veh/h]	44	656	48	24	519	9	15	5	31	74	1	28
Peak Hour Factor	0.9010	0.9010	0.9010	0.9640	0.9640	0.9640	0.6590	0.6590	0.6590	0.4680	0.4680	0.4680
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	12	182	13	6	135	2	6	2	12	40	1	15
Total Analysis Volume [veh/h]	49	728	53	25	538	9	23	8	47	158	2	60
Presence of On-Street Parking	No		No	No		No	No		No	No		Yes
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	1
Local Bus Stopping Rate [/h]	0	0	2	0	0	2	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			0			2			1		
v_di, Inbound Pedestrian Volume crossing m	2			1			2			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	1	6	0	0	2	0	0	4	0	0	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	7	20	0	0	20	0	0	10	0	0	10	0
Maximum Green [s]	20	50	0	0	50	0	0	35	0	0	35	0
Amber [s]	3.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0
All red [s]	1.5	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0
Split [s]	15	38	0	0	38	0	0	27	0	0	27	0
Vehicle Extension [s]	3.5	3.0	0.0	0.0	3.0	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Walk [s]	0	7	0	0	7	0	0	2	0	0	2	0
Pedestrian Clearance [s]	0	11	0	0	11	0	0	13	0	0	13	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.5	3.0	0.0	0.0	3.0	0.0	0.0	7.0	0.0	0.0	7.0	0.0
Minimum Recall	No	No			No			No			No	
Maximum Recall	No	No			No			No			No	
Pedestrian Recall	No	Yes			Yes			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Lane Group Calculations

Lane Group	L	C	L	C	C	R	C
C, Cycle Length [s]	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	9.00	9.00	9.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	2.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	3.00	7.00	7.00	7.00
g_i, Effective Green Time [s]	60	60	51	51	6	6	6
g / C, Green / Cycle	0.75	0.75	0.63	0.63	0.08	0.08	0.08
(v / s)_i Volume / Saturation Flow Rate	0.05	0.43	0.04	0.30	0.02	0.03	0.37
s, saturation flow rate [veh/h]	962	1818	686	1835	1585	1536	599
c, Capacity [veh/h]	715	1360	371	1163	200	118	123
d1, Uniform Delay [s]	3.74	4.45	14.49	7.65	34.70	35.13	39.43
k, delay calibration	0.13	0.50	0.50	0.50	0.08	0.08	0.22
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.05	1.77	0.35	1.37	0.26	1.60	366.18
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.07	0.57	0.07	0.47	0.15	0.40	1.78
d, Delay for Lane Group [s/veh]	3.79	6.22	14.84	9.01	34.97	36.73	405.61
Lane Group LOS	A	A	B	A	C	D	F
Critical Lane Group	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.15	4.35	0.30	4.52	0.57	0.91	15.09
50th-Percentile Queue Length [ft/ln]	3.63	108.79	7.53	112.95	14.30	22.69	377.25
95th-Percentile Queue Length [veh/ln]	0.26	7.77	0.54	8.00	1.03	1.63	24.90
95th-Percentile Queue Length [ft/ln]	6.53	194.32	13.56	200.10	25.75	40.85	622.59

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Movement, Approach, & Intersection Results

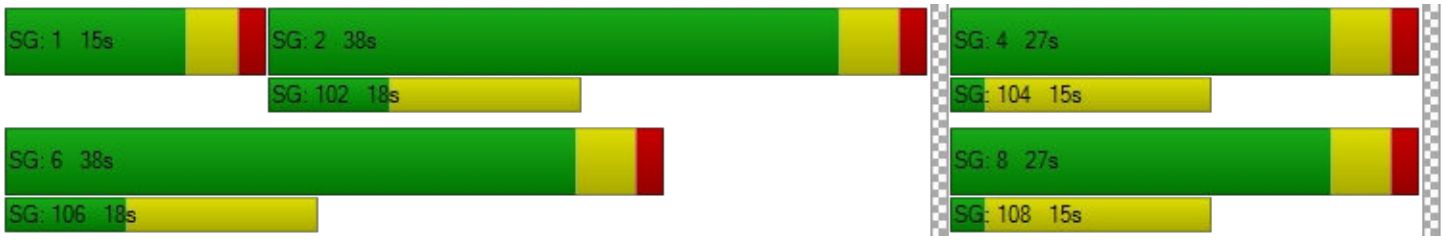
d_M, Delay for Movement [s/veh]	3.79	6.22	6.22	14.84	9.01	9.01	34.97	34.97	36.73	405.61	405.61	405.61
Movement LOS	A	A	A	B	A	A	C	C	D	F	F	F
d_A, Approach Delay [s/veh]	6.08			9.27			36.03			405.61		
Approach LOS	A			A			D			F		
d_I, Intersection Delay [s/veh]	60.23											
Intersection LOS	E											
Intersection V/C	0.797											

Other Modes

g_Walk,mi, Effective Walk Time [s]	6.0	6.0	11.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	3494.23	14062.50	3494.23	14019.72
M_CW, Crosswalk Circulation Area [ft²/ped]	784.15	5185.43	0.00	0.00
d_p, Pedestrian Delay [s]	34.23	34.23	29.76	29.76
l_p,int, Pedestrian LOS Score for Intersection	2.709	2.510	2.076	1.944
Crosswalk LOS	B	B	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	825	825	550	550
d_b, Bicycle Delay [s]	13.81	13.81	21.03	21.03
l_b,int, Bicycle LOS Score for Intersection	3.794	3.273	2.501	2.420
Bicycle LOS	D	C	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 6: Churchill St & Como Ave

Control Type:	Two-way stop	Delay (sec / veh):	12.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.008

Intersection Setup

Name	Churchill St			Churchill St			Como Ave			Como Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Churchill St			Churchill St			Como Ave			Como Ave		
Base Volume Input [veh/h]	7	0	1	8	2	9	12	52	7	2	87	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	15.00	10.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.03	1.03	1.03	1.03	1.09	1.09	1.14	1.09	1.03	1.14	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	0	1	8	2	10	13	59	8	2	99	6
Peak Hour Factor	0.5520	0.5520	0.5520	0.5520	0.5520	0.5520	0.5520	0.5520	0.5520	0.5520	0.5520	0.5520
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	0	0	4	1	5	6	27	4	1	45	3
Total Analysis Volume [veh/h]	14	0	2	14	4	18	24	107	14	4	179	11
Pedestrian Volume [ped/h]	7			16			7			5		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.00	0.03	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.81	12.05	9.13	11.80	12.21	9.92	7.82	0.00	0.00	7.50	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.09	0.09	0.09	0.18	0.18	0.18	0.03	0.03	0.03	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.16	2.16	2.16	4.42	4.42	4.42	0.76	0.76	0.76	0.10	0.10	0.10
d_A, Approach Delay [s/veh]	11.48			10.91			1.29			0.15		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	2.03											
Intersection LOS	B											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 7: Como Ave & West Parking Lot

Control Type:	Two-way stop	Delay (sec / veh):	12.4
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.012

Intersection Setup

Name	West Parking Lot		Como Ave		Como Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	West Parking Lot		Como Ave		Como Ave	
Base Volume Input [veh/h]	1	10	5	57	74	3
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.11	1.11	1.11	1.14	1.14	1.11
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	2	7	10	-10	-7	4
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	18	16	55	77	7
Peak Hour Factor	0.5140	0.5140	0.5140	0.5140	0.5140	0.5140
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	9	8	27	37	3
Total Analysis Volume [veh/h]	6	35	31	107	150	14
Pedestrian Volume [ped/h]	70		5		33	

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.05	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	12.35	10.12	7.97	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.19	0.19	0.04	0.04	0.00	0.00
95th-Percentile Queue Length [ft/ln]	4.64	4.64	0.98	0.98	0.00	0.00
d_A, Approach Delay [s/veh]	10.45		1.79		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.97					
Intersection LOS	B					

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 8: Como Ave & Oxford St

Control Type:	Two-way stop	Delay (sec / veh):	10.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.029

Intersection Setup

Name	Oxford St		Como Ave		Como Ave	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Oxford St		Como Ave		Como Ave	
Base Volume Input [veh/h]	11	5	40	16	8	49
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.14	1.09	1.09	1.14
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	-8	0	0	-3
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	5	38	17	9	53
Peak Hour Factor	0.5710	0.5710	0.5710	0.5710	0.5710	0.5710
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	2	17	7	4	23
Total Analysis Volume [veh/h]	21	9	67	30	16	93
Pedestrian Volume [ped/h]	5		25		33	

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

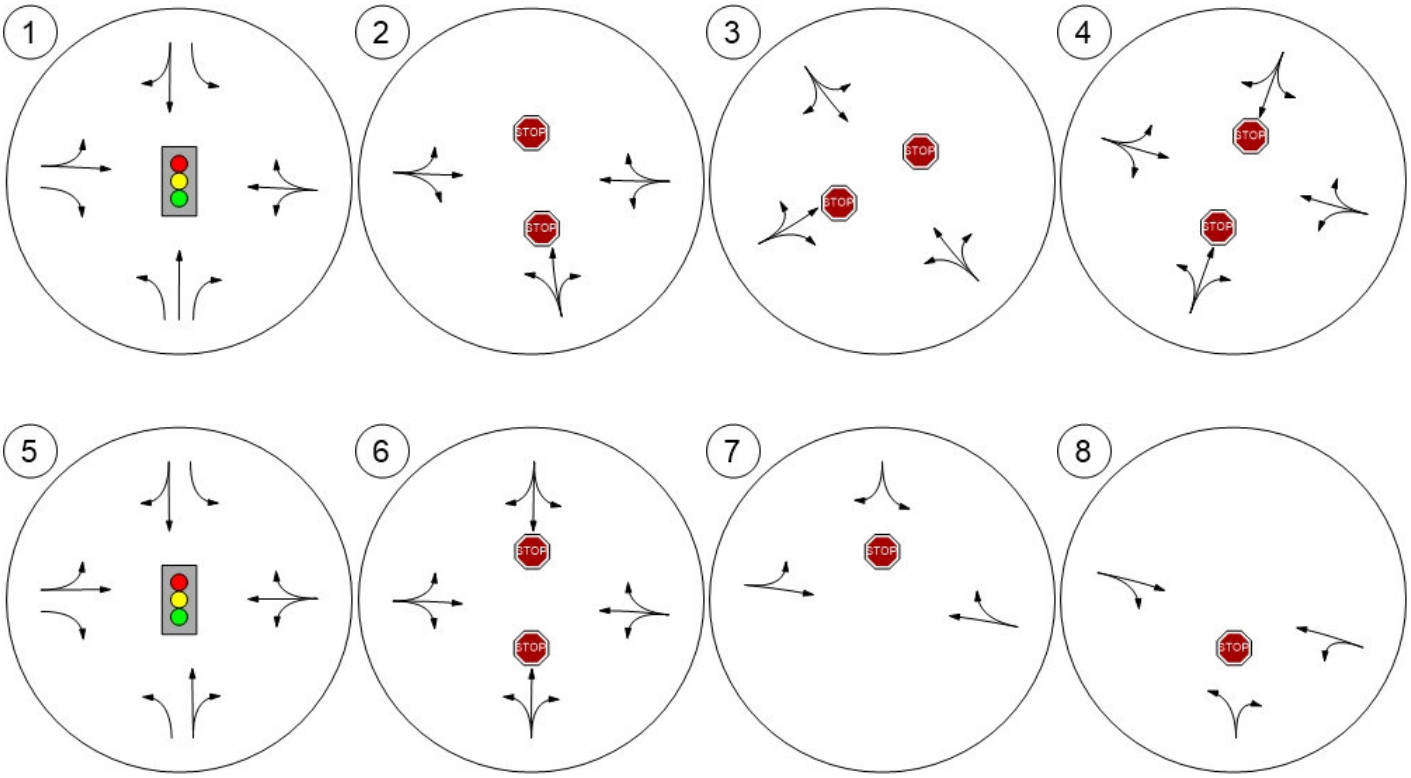
Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

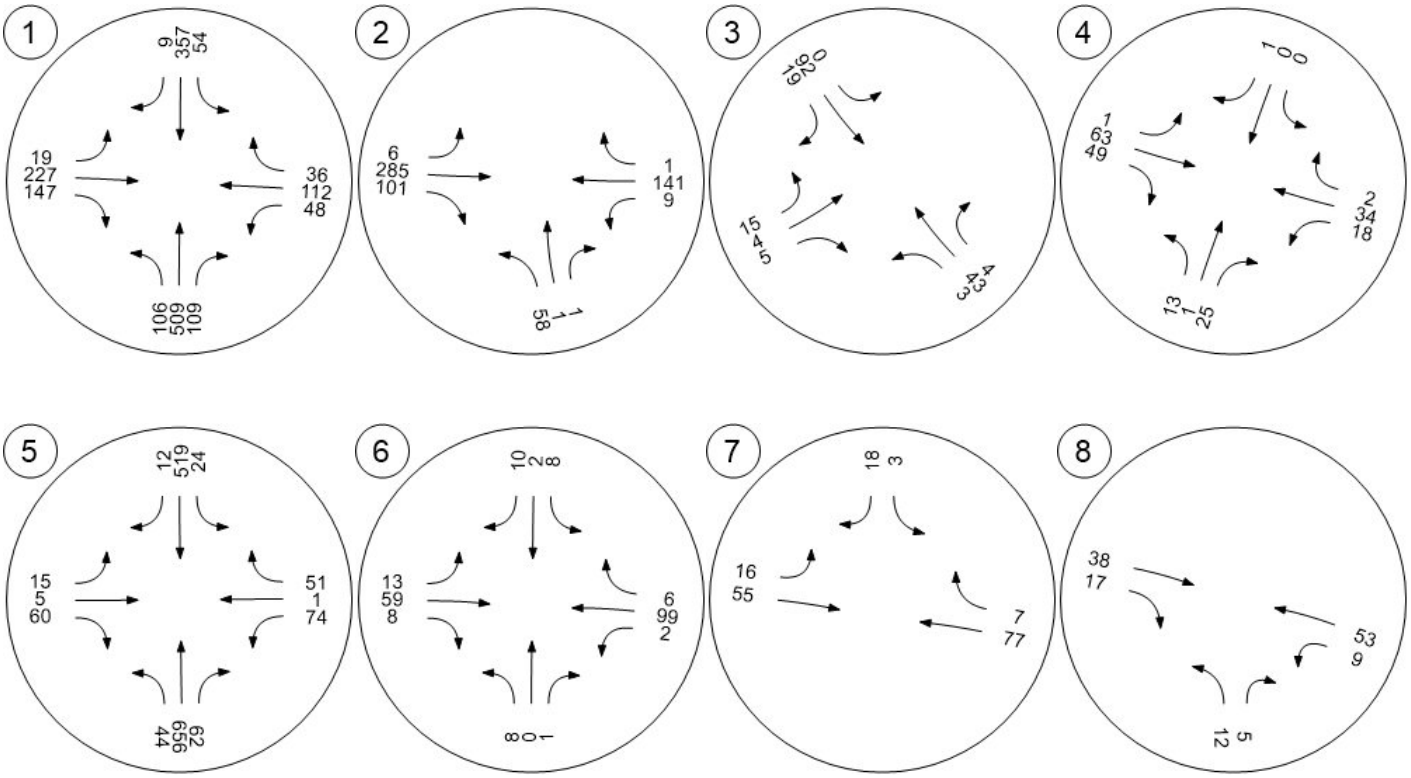
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.01	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	10.20	9.21	0.00	0.00	7.46	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.12	0.12	0.00	0.00	0.02	0.02
95th-Percentile Queue Length [ft/ln]	3.06	3.06	0.00	0.00	0.46	0.46
d_A, Approach Delay [s/veh]	9.90		0.00		1.10	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.76					
Intersection LOS	B					

Lane Configuration and Traffic Control



Traffic Volume - Future Total Volume



TCGIS

Vistro File: C:\...\TCGIS Vistro.vistro
Report File: C:\...\6 - PM 2023.pdf

Scenario 6 PM Existing 2023
11/29/2018

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Lexington Pkwy & Como Ave/Horton Ave	Signalized	HCM 6th Edition	WB Thru	0.669	26.0	C
2	Horton Ave & Van Slyke Ave	Two-way stop	HCM 6th Edition	NB Left	0.085	14.8	B
3	Van Slyke Ave & Churchill St	Two-way stop	HCM 6th Edition	NEB Thru	0.005	9.9	A
4	Van Slyke Ave & Como Ave	Two-way stop	HCM 6th Edition	NB Thru	0.001	9.9	A
5	Lexington Pkwy & Wynne Ave/Como Ave	Signalized	HCM 6th Edition	WB Left	0.699	11.1	B
6	Churchill St & Como Ave	Two-way stop	HCM 6th Edition	NB Thru	0.001	9.9	A
7	Como Ave & West Parking Lot	Two-way stop	HCM 6th Edition	SB Left	0.010	9.6	A
8	Como Ave & Oxford St	Two-way stop	HCM 6th Edition	NB Left	0.009	9.1	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 1: Lexington Pkwy & Como Ave/Horton Ave

Control Type:	Signalized	Delay (sec / veh):	26.0
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.669

Intersection Setup

Name	Lexington Pkwy			Lexington Pkwy			Como Ave			Horton Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	75.00	100.00	100.00	75.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Pkwy			Lexington Pkwy			Como Ave			Horton Ave		
Base Volume Input [veh/h]	123	669	87	37	377	15	33	278	140	32	126	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	6.00	3.00	3.00	3.00	3.00	3.00	3.00	8.00	4.00	4.00	10.00	3.00
Growth Rate	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	44	0	0	4	0	0	35	0	0	7
Total Hourly Volume [veh/h]	127	689	46	38	388	11	34	286	109	33	130	21
Peak Hour Factor	0.9610	0.9610	0.9610	0.8710	0.8710	0.8710	0.9110	0.9110	0.9110	0.9390	0.9390	0.9390
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	33	179	12	11	111	3	9	78	30	9	35	6
Total Analysis Volume [veh/h]	132	717	48	44	445	13	37	314	120	35	138	22
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	8	0	0	0
v_do, Outbound Pedestrian Volume crossing	4			1			2			1		
v_di, Inbound Pedestrian Volume crossing m	2			1			4			1		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	1	6	0	5	2	0	0	4	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	7	15	0	7	15	0	0	10	0	0	10	0
Maximum Green [s]	25	50	0	12	50	0	0	35	0	0	35	0
Amber [s]	3.0	3.5	0.0	3.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0
All red [s]	1.5	1.5	0.0	1.5	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0
Split [s]	12	36	0	12	36	0	0	32	0	0	32	0
Vehicle Extension [s]	3.5	3.0	0.0	2.3	3.0	0.0	0.0	4.5	0.0	0.0	4.5	0.0
Walk [s]	0	7	0	0	7	0	0	2	0	0	2	0
Pedestrian Clearance [s]	0	12	0	0	12	0	0	15	0	0	15	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.5	3.0	0.0	2.5	3.0	0.0	0.0	7.0	0.0	0.0	7.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	Yes		No	Yes			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Lane Group Calculations

Lane Group	L	C	R	L	C	C	R	C
C, Cycle Length [s]	80	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	9.00	9.00	9.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	0.00	3.00	7.00	7.00	7.00
g_i, Effective Green Time [s]	47	38	38	47	35	19	19	19
g / C, Green / Cycle	0.58	0.47	0.47	0.58	0.44	0.24	0.24	0.24
(v / s)_i Volume / Saturation Flow Rate	0.12	0.39	0.03	0.05	0.25	0.22	0.08	0.27
s, saturation flow rate [veh/h]	1065	1855	1577	882	1846	1604	1495	723
c, Capacity [veh/h]	583	872	741	401	815	441	365	230
d1, Uniform Delay [s]	9.24	18.32	11.59	12.05	16.58	28.85	24.83	27.13
k, delay calibration	0.13	0.50	0.50	0.50	0.50	0.19	0.19	0.19
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.24	8.62	0.17	0.55	2.79	5.56	0.89	14.22
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.23	0.82	0.06	0.11	0.56	0.80	0.33	0.85
d, Delay for Lane Group [s/veh]	9.48	26.94	11.76	12.60	19.37	34.41	25.73	41.35
Lane Group LOS	A	C	B	B	B	C	C	D
Critical Lane Group	No	Yes	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.95	12.45	0.47	0.35	6.42	6.90	1.91	3.97
50th-Percentile Queue Length [ft/ln]	23.83	311.29	11.84	8.76	160.39	172.49	47.70	99.35
95th-Percentile Queue Length [veh/ln]	1.72	18.24	0.85	0.63	10.57	11.21	3.43	7.15
95th-Percentile Queue Length [ft/ln]	42.90	455.96	21.31	15.77	264.24	280.18	85.85	178.84

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Movement, Approach, & Intersection Results

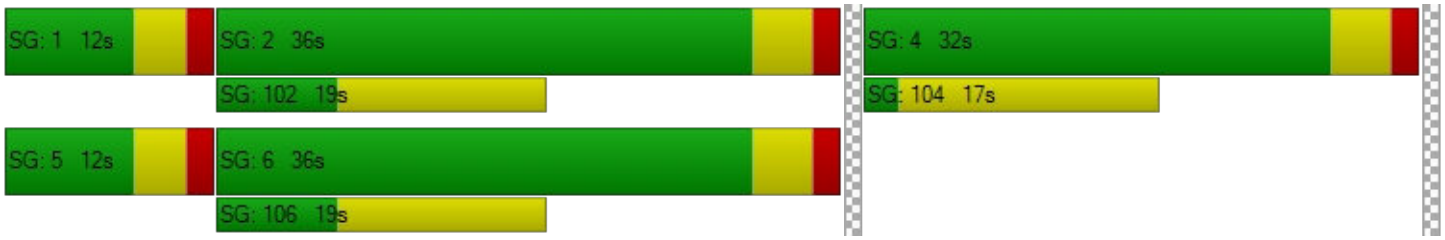
d_M, Delay for Movement [s/veh]	9.48	26.94	11.76	12.60	19.37	19.37	34.41	34.41	25.73	41.35	41.35	41.35
Movement LOS	A	C	B	B	B	B	C	C	C	D	D	D
d_A, Approach Delay [s/veh]	23.55			18.78			32.19			41.35		
Approach LOS	C			B			C			D		
d_I, Intersection Delay [s/veh]	26.04											
Intersection LOS	C											
Intersection V/C	0.669											

Other Modes

g_Walk,mi, Effective Walk Time [s]	6.0	6.0	11.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	2315.23	7009.86	2329.49	7009.86
M_CW, Crosswalk Circulation Area [ft²/ped]	852.74	3195.28	0.00	0.00
d_p, Pedestrian Delay [s]	34.23	34.23	29.76	29.76
l_p,int, Pedestrian LOS Score for Intersection	2.627	2.416	2.329	2.067
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	775	775	675	675
d_b, Bicycle Delay [s]	15.01	15.01	17.56	17.56
l_b,int, Bicycle LOS Score for Intersection	4.260	3.466	3.083	2.581
Bicycle LOS	E	C	C	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 2: Horton Ave & Van Slyke Ave

Control Type:	Two-way stop	Delay (sec / veh):	14.8
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.085

Intersection Setup

Name	Van Slyke Ave			Churchill St			Horton Ave			Horton Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Van Slyke Ave			Churchill St			Horton Ave			Horton Ave		
Base Volume Input [veh/h]	32	1	1	0	0	0	4	339	56	7	153	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	13.00	3.00	3.00	2.00	2.00	2.00	3.00	5.00	10.00	5.00	6.00	3.00
Growth Rate	1.03	1.03	1.03	1.00	1.00	1.00	1.03	1.03	1.03	1.03	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	33	1	1	0	0	0	4	349	58	7	158	2
Peak Hour Factor	0.9610	0.9610	0.9610	1.0000	1.0000	1.0000	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	0	0	0	0	0	1	91	15	2	41	1
Total Analysis Volume [veh/h]	34	1	1	0	0	0	4	363	60	7	164	2
Pedestrian Volume [ped/h]	2			3			1			2		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	14.81	14.54	11.41	0.00	0.00	0.00	7.58	0.00	0.00	8.25	0.00	0.00
Movement LOS	B	B	B				A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.29	0.29	0.29	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02
95th-Percentile Queue Length [ft/ln]	7.23	7.23	7.23	0.00	0.00	0.00	0.22	0.22	0.22	0.47	0.47	0.47
d_A, Approach Delay [s/veh]	14.70			0.00			0.07			0.33		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.97											
Intersection LOS	B											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 3: Van Slyke Ave & Churchill St

Control Type:	Two-way stop	Delay (sec / veh):	9.9
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.005

Intersection Setup

Name	Churchill St			Churchill St			Van Slyke Ave			Van Slyke Ave		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Churchill St			Churchill St			Van Slyke Ave			Van Slyke Ave		
Base Volume Input [veh/h]	5	4	1	0	0	0	1	29	5	0	55	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	15.00	3.00	2.00	2.00	2.00	17.00	15.00	4.00	30.00	10.00	15.00
Growth Rate	1.03	1.03	1.03	1.00	1.00	1.00	1.03	1.03	1.03	1.03	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	4	1	0	0	0	1	30	5	0	57	8
Peak Hour Factor	0.9250	0.9250	0.9250	1.0000	1.0000	1.0000	0.9250	0.9250	0.9250	0.9250	0.9250	0.9250
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	0	0	0	0	0	8	1	0	15	2
Total Analysis Volume [veh/h]	5	4	1	0	0	0	1	32	5	0	62	9
Pedestrian Volume [ped/h]	6			2			2			0		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.23	9.88	8.74	0.00	0.00	0.00	7.51	0.00	0.00	7.56	0.00	0.00
Movement LOS	A	A	A				A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.04	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.92	0.92	0.92	0.00	0.00	0.00	0.05	0.05	0.05	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.44			0.00			0.20			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	0.86											
Intersection LOS	A											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 4: Van Slyke Ave & Como Ave

Control Type:	Two-way stop	Delay (sec / veh):	9.9
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.001

Intersection Setup

Name	Como Ave			Driveway			Van Slyke Ave			Van Slyke Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Como Ave			Driveway			Van Slyke Ave			Van Slyke Ave		
Base Volume Input [veh/h]	8	1	23	1	1	1	2	36	14	8	23	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.00	3.00	5.00	3.00	3.00	3.00	3.00	15.00	3.00	6.00	17.00	3.00
Growth Rate	1.05	1.03	1.05	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	1	24	1	1	1	2	37	14	8	24	1
Peak Hour Factor	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	8	0	0	0	1	12	4	3	8	0
Total Analysis Volume [veh/h]	10	1	31	1	1	1	3	47	18	10	31	1
Pedestrian Volume [ped/h]	4			3			1			3		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	9.46	9.94	8.83	9.54	9.83	8.51	7.30	0.00	0.00	7.41	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.14	0.14	0.14	0.01	0.01	0.01	0.00	0.00	0.00	0.02	0.02	0.02
95th-Percentile Queue Length [ft/ln]	3.50	3.50	3.50	0.27	0.27	0.27	0.10	0.10	0.10	0.40	0.40	0.40
d_A, Approach Delay [s/veh]	9.01			9.29			0.32			1.77		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	3.24											
Intersection LOS	A											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 5: Lexington Pkwy & Wynne Ave/Como Ave

Control Type:	Signalized	Delay (sec / veh):	11.1
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.699

Intersection Setup

Name	Lexington Pkwy			Lexington Pkwy			Wynne Ave			Como Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Pkwy			Lexington Pkwy			Wynne Ave			Como Ave		
Base Volume Input [veh/h]	64	847	49	18	524	11	14	5	50	34	4	26
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	7.00	3.00	8.00	3.00	3.00	10.00	3.00
Growth Rate	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.05	1.05	1.05
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	12	0	0	3	0	0	25	0	0	7
Total Hourly Volume [veh/h]	66	872	38	19	540	8	14	5	27	36	4	20
Peak Hour Factor	0.9430	0.9430	0.9430	0.9000	0.9000	0.9000	0.6750	0.6750	0.6750	0.7500	0.7500	0.7500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	231	10	5	150	2	5	2	10	12	1	7
Total Analysis Volume [veh/h]	70	925	40	21	600	9	21	7	40	48	5	27
Presence of On-Street Parking	No		No	No		No	No		No	No		Yes
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	1
Local Bus Stopping Rate [/h]	0	0	2	0	0	2	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			1			6			1		
v_di, Inbound Pedestrian Volume crossing m	6			1			0			1		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	1	6	0	0	2	0	0	4	0	0	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	7	20	0	0	20	0	0	10	0	0	10	0
Maximum Green [s]	20	50	0	0	50	0	0	35	0	0	35	0
Amber [s]	3.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0
All red [s]	1.5	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0
Split [s]	15	38	0	0	38	0	0	27	0	0	27	0
Vehicle Extension [s]	3.5	3.0	0.0	0.0	3.0	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Walk [s]	0	7	0	0	7	0	0	2	0	0	2	0
Pedestrian Clearance [s]	0	11	0	0	11	0	0	13	0	0	13	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.5	3.0	0.0	0.0	3.0	0.0	0.0	7.0	0.0	0.0	7.0	0.0
Minimum Recall	No	No			No			No			No	
Maximum Recall	No	No			No			No			No	
Pedestrian Recall	No	Yes			Yes			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Lane Group Calculations

Lane Group	L	C	L	C	C	R	C
C, Cycle Length [s]	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	9.00	9.00	9.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	2.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	3.00	7.00	7.00	7.00
g_i, Effective Green Time [s]	62	62	51	51	5	5	5
g / C, Green / Cycle	0.77	0.77	0.64	0.64	0.06	0.06	0.06
(v / s)_i Volume / Saturation Flow Rate	0.08	0.53	0.04	0.33	0.02	0.03	0.17
s, saturation flow rate [veh/h]	932	1827	577	1835	1714	1494	468
c, Capacity [veh/h]	698	1403	289	1178	177	86	99
d1, Uniform Delay [s]	3.80	4.58	17.89	7.70	36.18	36.53	39.78
k, delay calibration	0.13	0.50	0.50	0.50	0.08	0.08	0.08
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.07	2.77	0.49	1.62	0.31	2.90	11.06
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.10	0.69	0.07	0.52	0.16	0.47	0.81
d, Delay for Lane Group [s/veh]	3.87	7.35	18.38	9.32	36.49	39.43	50.85
Lane Group LOS	A	A	B	A	D	D	D
Critical Lane Group	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.18	5.71	0.29	5.14	0.53	0.81	1.92
50th-Percentile Queue Length [ft/ln]	4.49	142.81	7.35	128.60	13.25	20.30	48.02
95th-Percentile Queue Length [veh/ln]	0.32	9.63	0.53	8.86	0.95	1.46	3.46
95th-Percentile Queue Length [ft/ln]	8.08	240.80	13.22	221.58	23.85	36.54	86.44

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Movement, Approach, & Intersection Results

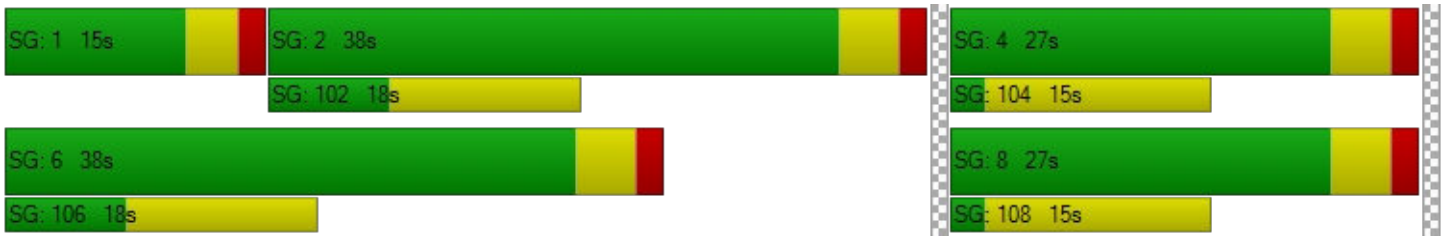
d_M, Delay for Movement [s/veh]	3.87	7.35	7.35	18.38	9.32	9.32	36.49	36.49	39.43	50.85	50.85	50.85
Movement LOS	A	A	A	B	A	A	D	D	D	D	D	D
d_A, Approach Delay [s/veh]	7.11			9.62			38.22			50.85		
Approach LOS	A			A			D			D		
d_I, Intersection Delay [s/veh]	11.08											
Intersection LOS	B											
Intersection V/C	0.699											

Other Modes

g_Walk,mi, Effective Walk Time [s]	6.0	6.0	11.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	2343.75	7009.86	2300.97	7009.86
M_CW, Crosswalk Circulation Area [ft²/ped]	889.50	2949.28	0.00	0.00
d_p, Pedestrian Delay [s]	34.23	34.23	29.76	29.76
l_p,int, Pedestrian LOS Score for Intersection	2.597	2.557	2.094	1.829
Crosswalk LOS	B	B	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	825	825	550	550
d_b, Bicycle Delay [s]	13.81	13.81	21.03	21.03
l_b,int, Bicycle LOS Score for Intersection	4.129	3.369	2.478	2.162
Bicycle LOS	D	C	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 6: Churchill St & Como Ave

Control Type:	Two-way stop	Delay (sec / veh):	9.9
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.001

Intersection Setup

Name	Churchill St			Churchill St			Como Ave			Como Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Churchill St			Churchill St			Como Ave			Como Ave		
Base Volume Input [veh/h]	13	1	1	3	1	4	5	53	7	0	45	3
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	15.00	10.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.05	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	1	1	3	1	4	5	55	7	0	47	3
Peak Hour Factor	0.9180	0.9180	0.9180	0.9180	0.9180	0.9180	0.9180	0.9180	0.9180	0.9180	0.9180	0.9180
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	0	0	1	0	1	1	15	2	0	13	1
Total Analysis Volume [veh/h]	14	1	1	3	1	4	5	60	8	0	51	3
Pedestrian Volume [ped/h]	4			3			2			2		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.46	9.91	8.74	9.38	9.88	8.75	7.42	0.00	0.00	7.37	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.06	0.06	0.06	0.03	0.03	0.03	0.01	0.01	0.01	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.48	1.48	1.48	0.69	0.69	0.69	0.25	0.25	0.25	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.44			9.13			0.51			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	1.73											
Intersection LOS	A											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 7: Como Ave & West Parking Lot

Control Type:	Two-way stop	Delay (sec / veh):	9.6
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

Intersection Setup

Name	West Parking Lot		Como Ave		Como Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	West Parking Lot		Como Ave		Como Ave	
Base Volume Input [veh/h]	2	9	3	51	38	3
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.11	1.11	1.11	1.05	1.05	1.11
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	5	10	12	-12	-10	3
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	20	15	42	30	6
Peak Hour Factor	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	6	4	12	9	2
Total Analysis Volume [veh/h]	8	23	17	48	34	7
Pedestrian Volume [ped/h]	16		7		18	

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.02	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.62	8.80	7.39	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.10	0.10	0.03	0.03	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.59	2.59	0.75	0.75	0.00	0.00
d_A, Approach Delay [s/veh]	9.01		1.93		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.96					
Intersection LOS	A					

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 8: Como Ave & Oxford St

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.009

Intersection Setup

Name	Oxford St		Como Ave		Como Ave	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Oxford St		Como Ave		Como Ave	
Base Volume Input [veh/h]	7	3	40	11	4	31
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.03	1.03	1.05	1.03	1.03	1.05
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	-7	0	0	-7
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	3	35	11	4	26
Peak Hour Factor	0.8770	0.8770	0.8770	0.8770	0.8770	0.8770
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	1	10	3	1	7
Total Analysis Volume [veh/h]	8	3	40	13	5	30
Pedestrian Volume [ped/h]	4		10		6	

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

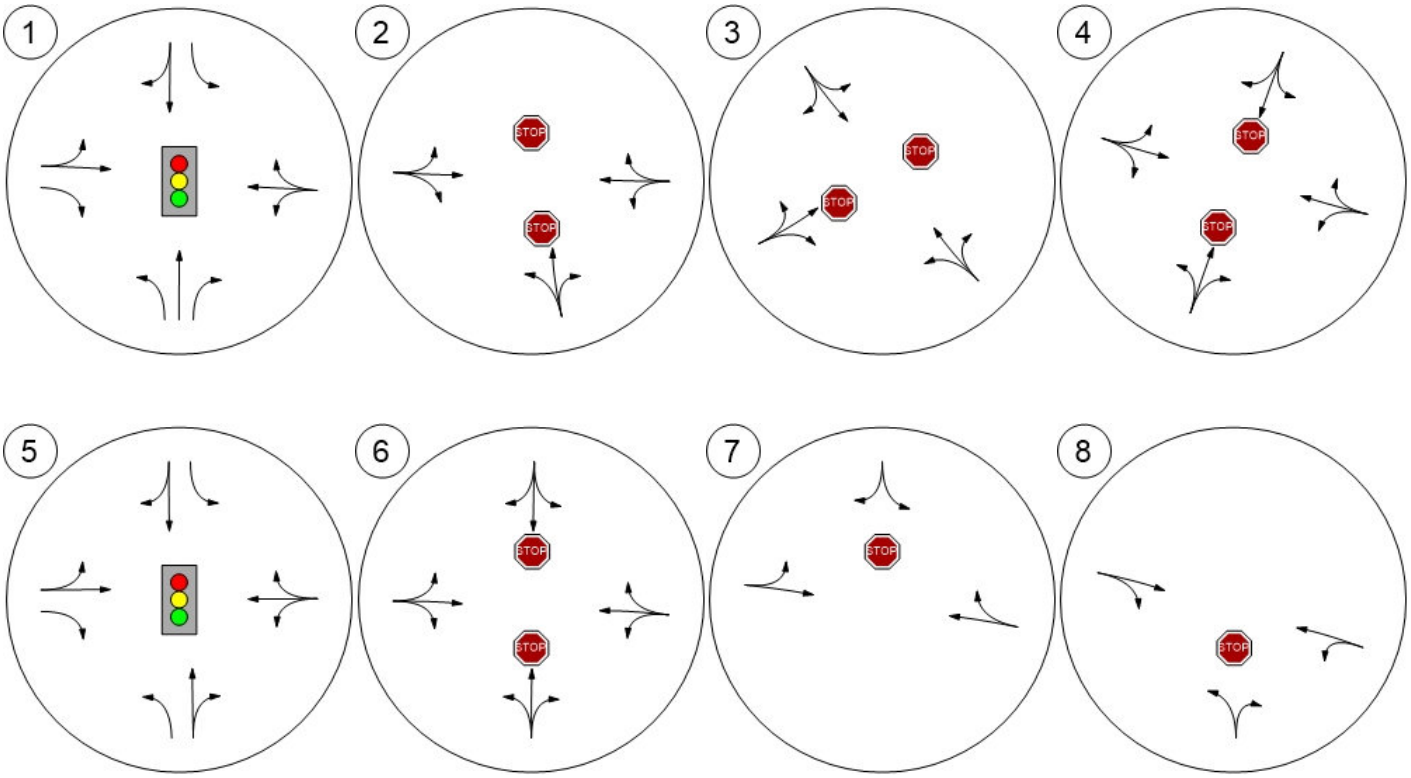
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.14	8.66	0.00	0.00	7.35	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.04	0.04	0.00	0.00	0.01	0.01
95th-Percentile Queue Length [ft/ln]	0.92	0.92	0.00	0.00	0.20	0.20
d_A, Approach Delay [s/veh]	9.01		0.00		1.05	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.37					
Intersection LOS	A					

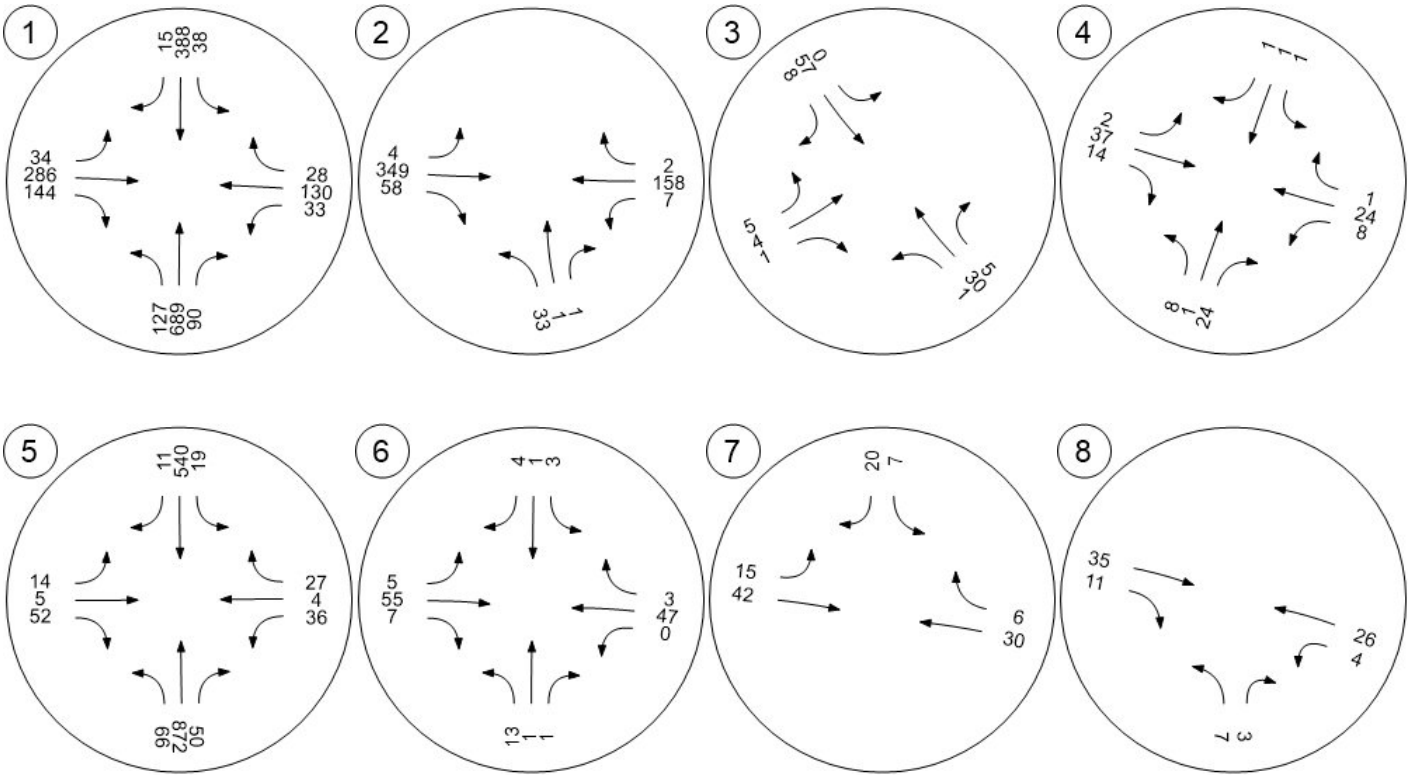
Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Lane Configuration and Traffic Control



Traffic Volume - Future Total Volume



TCGIS

Vistro File: C:\...\TCGIS Vistro.vistro
Report File: C:\...\7 - AM 2023 with Alternatives.pdf

Scenario 7 AM 2023 with Alts
11/30/2018

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Lexington Pkwy & Como Ave/Horton Ave	Signalized	HCM 6th Edition	WB Thru	0.681	28.1	C
2	Horton Ave & Van Slyke Ave	Two-way stop	HCM 6th Edition	NB Left	0.217	20.4	C
3	Van Slyke Ave & Churchill St	Two-way stop	HCM 6th Edition	NEB Thru	0.053	14.7	B
4	Van Slyke Ave & Como Ave	Two-way stop	HCM 6th Edition	SB Thru	0.006	15.9	C
5	Lexington Pkwy & Wynne Ave/Como Ave	Signalized	HCM 6th Edition	WB Left	0.773	37.2	D
6	Churchill St & Como Ave	Two-way stop	HCM 6th Edition	NB Thru	0.023	13.9	B
7	Como Ave & West Parking Lot	Two-way stop	HCM 6th Edition	SB Left	0.004	12.8	B
8	Como Ave & Oxford St	Two-way stop	HCM 6th Edition	NB Left	0.016	12.3	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 1: Lexington Pkwy & Como Ave/Horton Ave

Control Type:	Signalized	Delay (sec / veh):	28.1
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.681

Intersection Setup

Name	Lexington Pkwy			Lexington Pkwy			Como Ave			Horton Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	75.00	100.00	100.00	75.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Pkwy			Lexington Pkwy			Como Ave			Horton Ave		
Base Volume Input [veh/h]	113	240	86	62	524	32	7	173	178	53	192	23
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	6.00	3.00	3.00	3.00	3.00	3.00	3.00	8.00	4.00	4.00	10.00	3.00
Growth Rate	1.03	1.03	1.05	1.05	1.03	1.03	1.03	1.05	1.03	1.05	1.05	1.05
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	45	0	0	8	0	0	46	0	0	6
Total Hourly Volume [veh/h]	116	247	45	65	540	25	7	182	137	56	202	18
Peak Hour Factor	0.8330	0.8330	0.8330	0.8620	0.8620	0.8620	0.8430	0.8430	0.8430	0.8650	0.8650	0.8650
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	35	74	14	19	157	7	2	54	41	16	58	5
Total Analysis Volume [veh/h]	139	297	54	75	626	29	8	216	163	65	234	21
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	8	0	0	0
v_do, Outbound Pedestrian Volume crossing	3			2			3			1		
v_di, Inbound Pedestrian Volume crossing m	3			1			3			2		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix E - Capacity Analysis Backup

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	1	6	0	5	2	0	0	4	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	7	15	0	7	15	0	0	10	0	0	10	0
Maximum Green [s]	25	50	0	12	50	0	0	35	0	0	35	0
Amber [s]	3.0	3.5	0.0	3.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0
All red [s]	1.5	1.5	0.0	1.5	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0
Split [s]	12	36	0	12	36	0	0	32	0	0	32	0
Vehicle Extension [s]	3.5	3.0	0.0	2.3	3.0	0.0	0.0	4.5	0.0	0.0	4.5	0.0
Walk [s]	0	7	0	0	7	0	0	2	0	0	2	0
Pedestrian Clearance [s]	0	12	0	0	12	0	0	15	0	0	15	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.5	3.0	0.0	2.5	3.0	0.0	0.0	7.0	0.0	0.0	7.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	Yes		No	Yes			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Lane Group Calculations

Lane Group	L	C	R	L	C	C	R	C
C, Cycle Length [s]	80	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	9.00	9.00	9.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	0.00	3.00	7.00	7.00	7.00
g_i, Effective Green Time [s]	46	36	36	46	35	20	20	20
g / C, Green / Cycle	0.58	0.45	0.45	0.58	0.44	0.25	0.25	0.25
(v / s)_i Volume / Saturation Flow Rate	0.15	0.16	0.03	0.06	0.36	0.13	0.11	0.28
s, saturation flow rate [veh/h]	946	1855	1577	1196	1841	1763	1496	1136
c, Capacity [veh/h]	442	834	709	709	805	484	371	336
d1, Uniform Delay [s]	12.64	14.42	12.54	7.97	19.68	25.87	25.35	31.80
k, delay calibration	0.13	0.50	0.50	0.50	0.50	0.19	0.19	0.21
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.49	1.19	0.21	0.30	8.86	1.18	1.40	22.00
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.31	0.36	0.08	0.11	0.81	0.46	0.44	0.95
d, Delay for Lane Group [s/veh]	13.13	15.61	12.75	8.27	28.53	27.05	26.75	53.80
Lane Group LOS	B	B	B	A	C	C	C	D
Critical Lane Group	Yes	No	No	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	1.04	3.57	0.56	0.57	11.74	3.71	2.67	8.23
50th-Percentile Queue Length [ft/ln]	26.03	89.27	14.06	14.19	293.49	92.71	66.87	205.82
95th-Percentile Queue Length [veh/ln]	1.87	6.43	1.01	1.02	17.36	6.68	4.81	12.94
95th-Percentile Queue Length [ft/ln]	46.85	160.68	25.30	25.54	433.97	166.88	120.36	323.46

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Movement, Approach, & Intersection Results

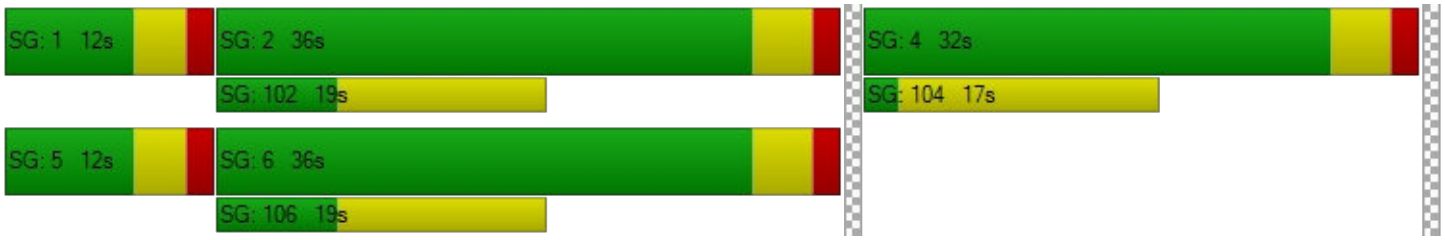
d_M, Delay for Movement [s/veh]	13.13	15.61	12.75	8.27	28.53	28.53	27.05	27.05	26.75	53.80	53.80	53.80
Movement LOS	B	B	B	A	C	C	C	C	C	D	D	D
d_A, Approach Delay [s/veh]	14.59			26.45			26.92			53.80		
Approach LOS	B			C			C			D		
d_I, Intersection Delay [s/veh]	28.07											
Intersection LOS	C											
Intersection V/C	0.681											

Other Modes

g_Walk,mi, Effective Walk Time [s]	6.0	6.0	11.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	2322.36	4658.98	2322.36	4673.24
M_CW, Crosswalk Circulation Area [ft²/ped]	675.57	2284.33	0.00	0.00
d_p, Pedestrian Delay [s]	34.23	34.23	29.76	29.76
l_p,int, Pedestrian LOS Score for Intersection	2.636	2.310	2.365	2.117
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	775	775	675	675
d_b, Bicycle Delay [s]	15.01	15.01	17.56	17.56
l_b,int, Bicycle LOS Score for Intersection	3.590	3.848	2.963	2.786
Bicycle LOS	D	D	C	C

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 2: Horton Ave & Van Slyke Ave

Control Type:	Two-way stop	Delay (sec / veh):	20.4
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.217

Intersection Setup

Name	Van Slyke Ave			Churchill St			Horton Ave			Horton Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Van Slyke Ave			Churchill St			Horton Ave			Horton Ave		
Base Volume Input [veh/h]	45	1	0	0	0	0	2	159	163	27	223	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	13.00	3.00	3.00	2.00	2.00	2.00	3.00	5.00	10.00	5.00	6.00	3.00
Growth Rate	1.09	1.03	1.09	1.00	1.00	1.00	1.03	1.03	1.14	1.14	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	49	1	0	0	0	0	2	164	186	31	230	0
Peak Hour Factor	0.7490	0.7490	0.7490	1.0000	1.0000	1.0000	0.7490	0.7490	0.7490	0.7490	0.7490	0.7490
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	0	0	0	0	0	1	55	62	10	77	0
Total Analysis Volume [veh/h]	65	1	0	0	0	0	3	219	248	41	307	0
Pedestrian Volume [ped/h]	2			6			4			4		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
d_M, Delay for Movement [s/veh]	20.36	19.55	13.58	0.00	0.00	0.00	7.92	0.00	0.00	8.48	0.00	0.00
Movement LOS	C	C	B				A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.82	0.82	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.09
95th-Percentile Queue Length [ft/ln]	20.56	20.56	20.56	0.00	0.00	0.00	0.12	0.12	0.12	2.23	2.23	2.23
d_A, Approach Delay [s/veh]	20.34			0.00			0.05			1.00		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	1.94											
Intersection LOS	C											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 3: Van Slyke Ave & Churchill St

Control Type:	Two-way stop	Delay (sec / veh):	14.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.053

Intersection Setup

Name	Churchill St			Churchill St			Van Slyke Ave			Van Slyke Ave		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			No		

Volumes

Name	Churchill St			Churchill St			Van Slyke Ave			Van Slyke Ave		
Base Volume Input [veh/h]	16	11	6	0	0	0	0	29	3	0	172	19
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	15.00	3.00	2.00	2.00	2.00	17.00	15.00	4.00	30.00	10.00	15.00
Growth Rate	1.09	1.03	1.03	1.00	1.00	1.00	1.03	1.09	1.03	1.03	1.14	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	17	11	6	0	0	0	0	32	3	0	196	21
Peak Hour Factor	0.4700	0.4700	0.4700	1.0000	1.0000	1.0000	0.4700	0.4700	0.4700	0.4700	0.4700	0.4700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	6	3	0	0	0	0	17	2	0	104	11
Total Analysis Volume [veh/h]	36	23	13	0	0	0	0	68	6	0	417	45
Pedestrian Volume [ped/h]	12			3			4			0		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	14.25	14.74	12.46	0.00	0.00	0.00	8.59	0.00	0.00	7.65	0.00	0.00
Movement LOS	B	B	B				A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.54	0.54	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	13.49	13.49	13.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	14.08			0.00			0.00			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	1.67											
Intersection LOS	B											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 4: Van Slyke Ave & Como Ave

Control Type:	Two-way stop	Delay (sec / veh):	15.9
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	Como Ave			Driveway			Van Slyke Ave			Van Slyke Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Como Ave			Driveway			Van Slyke Ave			Van Slyke Ave		
Base Volume Input [veh/h]	4	1	14	1	1	1	0	80	98	42	26	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.00	3.00	5.00	3.00	3.00	3.00	3.00	15.00	3.00	6.00	17.00	3.00
Growth Rate	1.14	1.03	1.14	1.03	1.03	1.03	1.03	1.14	1.14	1.14	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	1	16	1	1	1	0	91	112	48	27	0
Peak Hour Factor	0.4810	0.4810	0.4810	0.4810	0.4810	0.4810	0.4810	0.4810	0.4810	0.4810	0.4810	0.4810
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	1	8	1	1	1	0	47	58	25	14	0
Total Analysis Volume [veh/h]	10	2	33	2	2	2	0	189	233	100	56	0
Pedestrian Volume [ped/h]	4			3			1			1		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.01	0.05	0.01	0.01	0.00	0.00	0.00	0.00	0.09	0.00	0.00
d_M, Delay for Movement [s/veh]	14.62	14.78	10.51	14.81	15.93	8.71	7.35	0.00	0.00	8.57	0.00	0.00
Movement LOS	B	B	B	B	C	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.25	0.25	0.25	0.04	0.04	0.04	0.00	0.00	0.00	0.14	0.14	0.14
95th-Percentile Queue Length [ft/ln]	6.18	6.18	6.18	1.02	1.02	1.02	0.00	0.00	0.00	3.39	3.39	3.39
d_A, Approach Delay [s/veh]	11.61			13.15			0.00			5.49		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	2.32											
Intersection LOS	C											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 5: Lexington Pkwy & Wynne Ave/Como Ave

Control Type:	Signalized	Delay (sec / veh):	37.2
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.773

Intersection Setup

Name	Lexington Pkwy			Lexington Pkwy			Wynne Ave			Como Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Pkwy			Lexington Pkwy			Wynne Ave			Como Ave		
Base Volume Input [veh/h]	48	362	50	19	728	11	5	3	47	101	3	52
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	7.00	3.00	8.00	3.00	3.00	10.00	3.00
Growth Rate	1.03	1.03	1.14	1.14	1.03	1.03	1.03	1.14	1.03	1.14	1.14	1.14
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	14	0	0	3	0	0	24	0	0	15
Total Hourly Volume [veh/h]	49	373	43	22	750	8	5	3	24	115	3	44
Peak Hour Factor	0.8830	0.8830	0.8830	0.9240	0.9240	0.9240	0.8180	0.8180	0.8180	0.4920	0.4920	0.4920
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	14	106	12	6	203	2	2	1	7	58	2	22
Total Analysis Volume [veh/h]	55	422	49	24	812	9	6	4	29	234	6	89
Presence of On-Street Parking	No		No	No		No	No		No	No		Yes
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	1
Local Bus Stopping Rate [/h]	0	0	2	0	0	2	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3			2			4			2		
v_di, Inbound Pedestrian Volume crossing m	4			2			3			2		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	1	6	0	0	2	0	0	4	0	0	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	7	20	0	0	20	0	0	20	0	0	20	0
Maximum Green [s]	20	50	0	0	50	0	0	30	0	0	30	0
Amber [s]	3.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0
All red [s]	1.5	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0
Split [s]	14	33	0	0	33	0	0	33	0	0	33	0
Vehicle Extension [s]	3.5	3.0	0.0	0.0	3.0	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Walk [s]	0	7	0	0	7	0	0	2	0	0	2	0
Pedestrian Clearance [s]	0	11	0	0	11	0	0	13	0	0	13	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.5	3.0	0.0	0.0	3.0	0.0	0.0	7.0	0.0	0.0	7.0	0.0
Minimum Recall	No	No			No			No			No	
Maximum Recall	No	No			No			No			No	
Pedestrian Recall	No	Yes			Yes			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Lane Group Calculations

Lane Group	L	C	L	C	C	R	C
C, Cycle Length [s]	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	9.00	9.00	9.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	2.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	3.00	7.00	7.00	7.00
g_i, Effective Green Time [s]	50	50	40	40	16	16	16
g / C, Green / Cycle	0.62	0.62	0.51	0.51	0.20	0.20	0.20
(v / s)_i Volume / Saturation Flow Rate	0.07	0.26	0.03	0.45	0.01	0.02	0.31
s, saturation flow rate [veh/h]	826	1807	915	1837	1465	1549	1057
c, Capacity [veh/h]	377	1126	401	928	368	313	290
d1, Uniform Delay [s]	13.22	7.69	17.88	17.72	25.62	25.95	34.81
k, delay calibration	0.13	0.50	0.50	0.50	0.08	0.08	0.09
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.21	1.15	0.29	12.11	0.02	0.09	67.85
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.15	0.42	0.06	0.89	0.03	0.09	1.13
d, Delay for Lane Group [s/veh]	13.44	8.83	18.16	29.83	25.64	26.05	102.66
Lane Group LOS	B	A	B	C	C	C	F
Critical Lane Group	Yes	No	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.33	3.84	0.32	15.13	0.15	0.45	11.09
50th-Percentile Queue Length [ft/ln]	8.32	96.06	8.04	378.35	3.80	11.19	277.26
95th-Percentile Queue Length [veh/ln]	0.60	6.92	0.58	21.51	0.27	0.81	17.58
95th-Percentile Queue Length [ft/ln]	14.97	172.90	14.46	537.84	6.83	20.14	439.52

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	13.44	8.83	8.83	18.16	29.83	29.83	25.64	25.64	26.05	102.66	102.66	102.66
Movement LOS	B	A	A	B	C	C	C	C	C	F	F	F
d_A, Approach Delay [s/veh]	9.31			29.50			25.94			102.66		
Approach LOS	A			C			C			F		
d_I, Intersection Delay [s/veh]	37.16											
Intersection LOS	D											
Intersection V/C	0.773											

Other Modes

g_Walk,mi, Effective Walk Time [s]	6.0	6.0	11.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	1990.59	3494.23	1984.48	3494.23
M_CW, Crosswalk Circulation Area [ft²/ped]	291.61	1234.80	0.00	0.00
d_p, Pedestrian Delay [s]	34.23	34.23	29.76	29.76
l_p,int, Pedestrian LOS Score for Intersection	2.825	2.479	2.053	1.976
Crosswalk LOS	C	B	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	700	700	700	700
d_b, Bicycle Delay [s]	16.90	16.90	16.90	16.90
l_b,int, Bicycle LOS Score for Intersection	3.292	3.724	2.429	2.586
Bicycle LOS	C	D	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 6: Churchill St & Como Ave

Control Type:	Two-way stop	Delay (sec / veh):	13.9
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.023

Intersection Setup

Name	Churchill St			Churchill St			Como Ave			Como Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Churchill St			Churchill St			Como Ave			Como Ave		
Base Volume Input [veh/h]	8	5	0	6	1	7	8	58	3	2	135	19
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	15.00	10.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.03	1.03	1.03	1.03	1.09	1.09	1.14	1.09	1.03	1.14	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	9	5	0	6	1	8	9	66	3	2	154	20
Peak Hour Factor	0.4960	0.4960	0.4960	0.4960	0.4960	0.4960	0.4960	0.4960	0.4960	0.4960	0.4960	0.4960
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	3	0	3	1	4	5	33	2	1	78	10
Total Analysis Volume [veh/h]	18	10	0	12	2	16	18	133	6	4	310	40
Pedestrian Volume [ped/h]	6			6			1			2		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.02	0.00	0.03	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.78	13.90	9.59	13.49	13.54	10.75	8.17	0.00	0.00	7.54	0.00	0.00
Movement LOS	B	B	A	B	B	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.21	0.21	0.21	0.18	0.18	0.18	0.02	0.02	0.02	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	5.13	5.13	5.13	4.38	4.38	4.38	0.59	0.59	0.59	0.11	0.11	0.11
d_A, Approach Delay [s/veh]	13.82			12.03			0.94			0.09		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	1.63											
Intersection LOS	B											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 7: Como Ave & West Parking Lot

Control Type:	Two-way stop	Delay (sec / veh):	12.8
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	West Parking Lot		Como Ave		Como Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	West Parking Lot		Como Ave		Como Ave	
Base Volume Input [veh/h]	1	2	8	48	148	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.11	1.11	1.11	1.14	1.14	1.11
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	5	12	-12	-5	1
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1	7	21	43	164	3
Peak Hour Factor	0.4880	0.4880	0.4880	0.4880	0.4880	0.4880
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	4	11	22	84	2
Total Analysis Volume [veh/h]	2	14	43	88	336	6
Pedestrian Volume [ped/h]	27		0		0	

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.02	0.04	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	12.80	10.59	8.23	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.08	0.08	0.06	0.06	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.95	1.95	1.38	1.38	0.00	0.00
d_A, Approach Delay [s/veh]	10.87		2.70		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.08					
Intersection LOS	B					

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 8: Como Ave & Oxford St

Control Type:	Two-way stop	Delay (sec / veh):	12.3
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.016

Intersection Setup

Name	Oxford St		Como Ave		Como Ave	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Oxford St		Como Ave		Como Ave	
Base Volume Input [veh/h]	4	0	33	16	5	147
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.14	1.09	1.09	1.14
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	-12	0	0	-4
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	0	26	17	5	164
Peak Hour Factor	0.4790	0.4790	0.4790	0.4790	0.4790	0.4790
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	14	9	3	86
Total Analysis Volume [veh/h]	8	0	54	35	10	342
Pedestrian Volume [ped/h]	1		54		0	

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

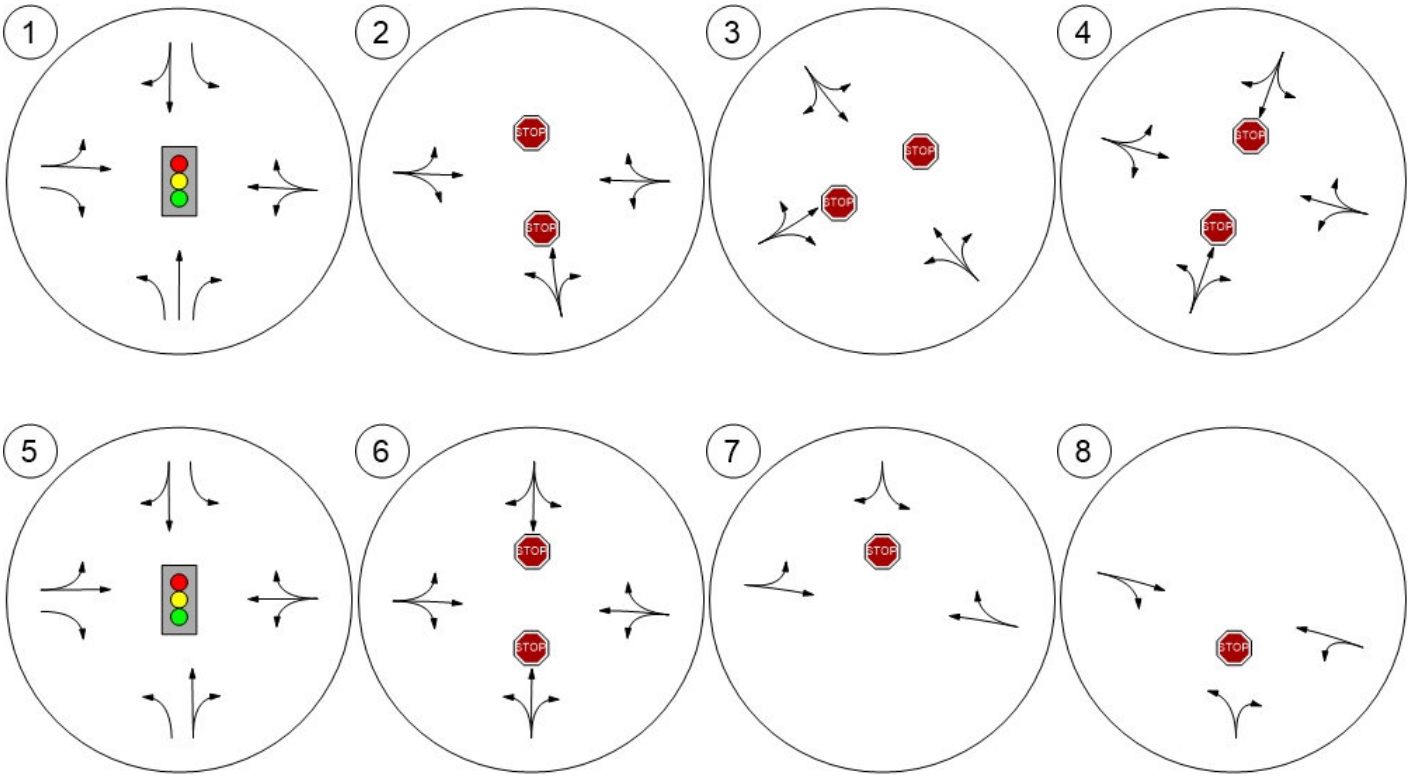
Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

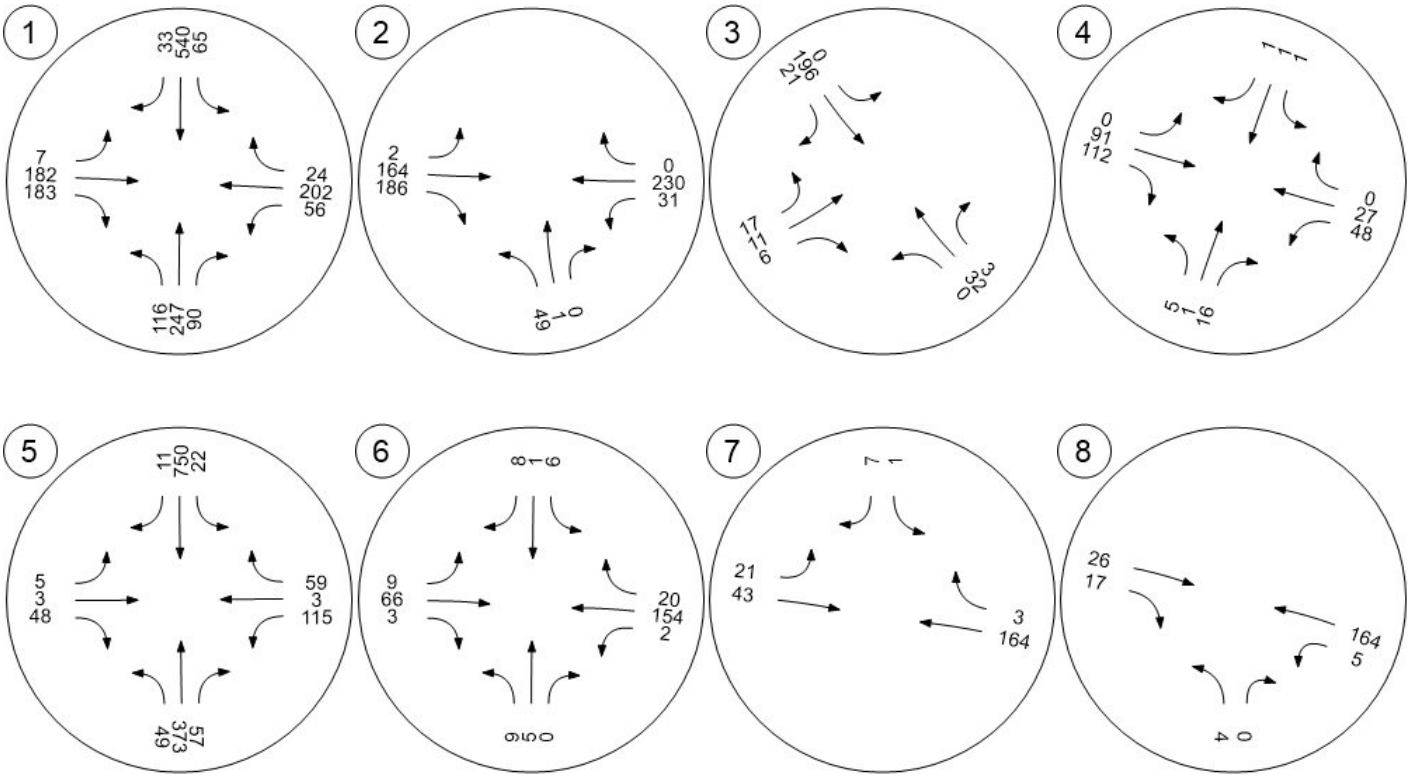
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	12.25	8.77	0.00	0.00	7.42	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.05	0.05	0.00	0.00	0.01	0.01
95th-Percentile Queue Length [ft/ln]	1.21	1.21	0.00	0.00	0.25	0.25
d_A, Approach Delay [s/veh]	12.25		0.00		0.21	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.38					
Intersection LOS	B					

Lane Configuration and Traffic Control



Traffic Volume - Future Total Volume



TCGIS

Vistro File: C:\...\TCGIS Vistro.vistro
Report File: C:\...\8 - School PM 2023 with Alternatives.pdf

Scenario 8 School PM 2023 with Alts
11/30/2018

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Lexington Pkwy & Como Ave/Horton Ave	Signalized	HCM 6th Edition	WB Thru	0.558	22.2	C
2	Horton Ave & Van Slyke Ave	Two-way stop	HCM 6th Edition	NB Left	0.155	15.3	C
3	Van Slyke Ave & Churchill St	Two-way stop	HCM 6th Edition	NEB Thru	0.007	10.6	B
4	Van Slyke Ave & Como Ave	Two-way stop	HCM 6th Edition	NB Thru	0.002	11.0	B
5	Lexington Pkwy & Wynne Ave/Como Ave	Signalized	HCM 6th Edition	WB Left	0.719	31.4	C
6	Churchill St & Como Ave	Two-way stop	HCM 6th Edition	SB Thru	0.005	11.2	B
7	Como Ave & West Parking Lot	Two-way stop	HCM 6th Edition	SB Left	0.006	10.9	B
8	Como Ave & Oxford St	Two-way stop	HCM 6th Edition	NB Left	0.028	11.6	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 1: Lexington Pkwy & Como Ave/Horton Ave

Control Type:	Signalized	Delay (sec / veh):	22.2
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.558

Intersection Setup

Name	Lexington Pkwy			Lexington Pkwy			Como Ave			Horton Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	75.00	100.00	100.00	75.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Pkwy			Lexington Pkwy			Como Ave			Horton Ave		
Base Volume Input [veh/h]	103	494	104	51	347	9	18	216	143	46	107	34
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	6.00	3.00	3.00	3.00	3.00	3.00	3.00	8.00	4.00	4.00	10.00	3.00
Growth Rate	1.03	1.03	1.05	1.05	1.03	1.03	1.03	1.05	1.03	1.05	1.05	1.05
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	52	0	0	2	0	0	36	0	0	9
Total Hourly Volume [veh/h]	106	509	57	54	357	7	19	227	111	48	112	27
Peak Hour Factor	0.8940	0.8940	0.8940	0.9100	0.9100	0.9100	0.9090	0.9090	0.9090	0.8860	0.8860	0.8860
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	30	142	16	15	98	2	5	62	31	14	32	8
Total Analysis Volume [veh/h]	119	569	64	59	392	8	21	250	122	54	126	30
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	8	0	0	0
v_do, Outbound Pedestrian Volume crossing	4			6			9			3		
v_di, Inbound Pedestrian Volume crossing m	9			3			4			6		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix E - Capacity Analysis Backup

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	1	6	0	5	2	0	0	4	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	7	15	0	7	15	0	0	10	0	0	10	0
Maximum Green [s]	25	50	0	12	50	0	0	35	0	0	35	0
Amber [s]	3.0	3.5	0.0	3.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0
All red [s]	1.5	1.5	0.0	1.5	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0
Split [s]	12	36	0	12	36	0	0	32	0	0	32	0
Vehicle Extension [s]	3.5	3.0	0.0	2.3	3.0	0.0	0.0	4.5	0.0	0.0	4.5	0.0
Walk [s]	0	7	0	0	7	0	0	2	0	0	2	0
Pedestrian Clearance [s]	0	12	0	0	12	0	0	15	0	0	15	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.5	3.0	0.0	2.5	3.0	0.0	0.0	7.0	0.0	0.0	7.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	Yes		No	Yes			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	R	C
C, Cycle Length [s]	80	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	9.00	9.00	9.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	0.00	3.00	7.00	7.00	7.00
g_i, Effective Green Time [s]	48	38	38	48	37	19	19	19
g / C, Green / Cycle	0.59	0.47	0.47	0.59	0.46	0.23	0.23	0.23
(v / s)_i Volume / Saturation Flow Rate	0.11	0.31	0.04	0.06	0.22	0.16	0.08	0.23
s, saturation flow rate [veh/h]	1101	1855	1577	987	1848	1706	1472	895
c, Capacity [veh/h]	640	876	745	523	840	445	342	264
d1, Uniform Delay [s]	8.21	16.13	11.65	9.25	15.26	27.95	25.76	30.58
k, delay calibration	0.13	0.50	0.50	0.50	0.50	0.19	0.19	0.19
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.17	3.72	0.23	0.44	1.93	2.31	1.08	8.92
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.19	0.65	0.09	0.11	0.48	0.61	0.36	0.79
d, Delay for Lane Group [s/veh]	8.38	19.84	11.88	9.69	17.20	30.26	26.84	39.51
Lane Group LOS	A	B	B	A	B	C	C	D
Critical Lane Group	No	Yes	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.82	8.17	0.64	0.44	5.17	4.84	1.99	4.64
50th-Percentile Queue Length [ft/ln]	20.44	204.21	15.93	10.99	129.24	120.91	49.76	115.92
95th-Percentile Queue Length [veh/ln]	1.47	12.86	1.15	0.79	8.90	8.44	3.58	8.17
95th-Percentile Queue Length [ft/ln]	36.79	321.38	28.68	19.78	222.46	211.07	89.58	204.20

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Movement, Approach, & Intersection Results

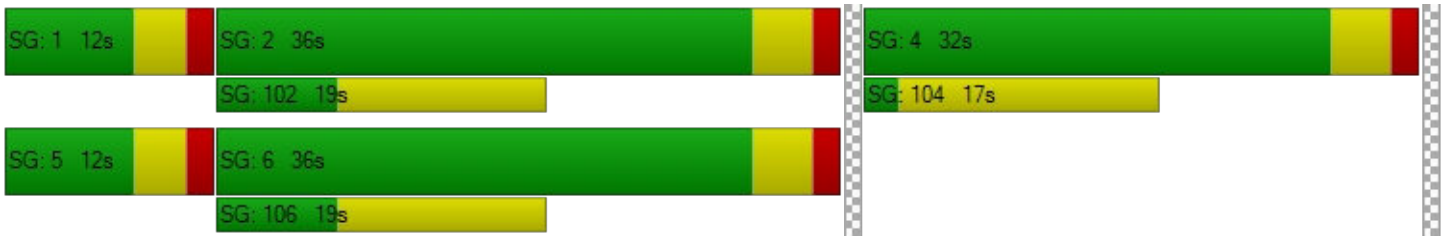
d_M, Delay for Movement [s/veh]	8.38	19.84	11.88	9.69	17.20	17.20	30.26	30.26	26.84	39.51	39.51	39.51
Movement LOS	A	B	B	A	B	B	C	C	C	D	D	D
d_A, Approach Delay [s/veh]	17.35			16.23			29.20			39.51		
Approach LOS	B			B			C			D		
d_I, Intersection Delay [s/veh]	22.20											
Intersection LOS	C											
Intersection V/C	0.558											

Other Modes

g_Walk,mi, Effective Walk Time [s]	6.0	6.0	11.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	1068.57	1533.98	1052.11	1548.24
M_CW, Crosswalk Circulation Area [ft²/ped]	369.65	723.02	0.00	0.00
d_p, Pedestrian Delay [s]	34.23	34.23	29.76	29.76
l_p,int, Pedestrian LOS Score for Intersection	2.624	2.326	2.288	2.077
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	775	775	675	675
d_b, Bicycle Delay [s]	15.01	15.01	17.56	17.56
l_b,int, Bicycle LOS Score for Intersection	4.034	3.391	2.956	2.609
Bicycle LOS	D	C	C	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 2: Horton Ave & Van Slyke Ave

Control Type:	Two-way stop	Delay (sec / veh):	15.3
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.155

Intersection Setup

Name	Van Slyke Ave			Churchill St			Horton Ave			Horton Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Van Slyke Ave			Churchill St			Horton Ave			Horton Ave		
Base Volume Input [veh/h]	53	1	1	0	0	0	6	277	89	8	137	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	13.00	3.00	3.00	2.00	2.00	2.00	3.00	5.00	10.00	5.00	6.00	3.00
Growth Rate	1.09	1.03	1.09	1.00	1.00	1.00	1.03	1.03	1.14	1.14	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	58	1	1	0	0	0	6	285	101	9	141	1
Peak Hour Factor	0.9130	0.9130	0.9130	1.0000	1.0000	1.0000	0.9130	0.9130	0.9130	0.9130	0.9130	0.9130
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	0	0	0	0	0	2	78	28	2	39	0
Total Analysis Volume [veh/h]	64	1	1	0	0	0	7	312	111	10	154	1
Pedestrian Volume [ped/h]	2			3			3			2		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	15.34	15.09	12.00	0.00	0.00	0.00	7.56	0.00	0.00	8.25	0.00	0.00
Movement LOS	C	C	B				A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.56	0.56	0.56	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02
95th-Percentile Queue Length [ft/ln]	13.98	13.98	13.98	0.00	0.00	0.00	0.32	0.32	0.32	0.61	0.61	0.61
d_A, Approach Delay [s/veh]	15.29			0.00			0.12			0.50		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	1.73											
Intersection LOS	C											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 3: Van Slyke Ave & Churchill St

Control Type:	Two-way stop	Delay (sec / veh):	10.6
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.007

Intersection Setup

Name	Churchill St			Churchill St			Van Slyke Ave			Van Slyke Ave		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			No		

Volumes

Name	Churchill St			Churchill St			Van Slyke Ave			Van Slyke Ave		
Base Volume Input [veh/h]	14	4	5	0	0	0	3	39	4	0	81	17
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	15.00	3.00	2.00	2.00	2.00	17.00	15.00	4.00	30.00	10.00	15.00
Growth Rate	1.09	1.03	1.03	1.00	1.00	1.00	1.03	1.09	1.03	1.03	1.14	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	15	4	5	0	0	0	3	43	4	0	92	19
Peak Hour Factor	0.8040	0.8040	0.8040	1.0000	1.0000	1.0000	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	1	2	0	0	0	1	13	1	0	29	6
Total Analysis Volume [veh/h]	19	5	6	0	0	0	4	53	5	0	114	24
Pedestrian Volume [ped/h]	6			1			3			0		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.96	10.58	9.18	0.00	0.00	0.00	7.69	0.00	0.00	7.60	0.00	0.00
Movement LOS	A	B	A				A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.12	0.12	0.12	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.06	3.06	3.06	0.00	0.00	0.00	0.17	0.17	0.17	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.91			0.00			0.50			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	1.43											
Intersection LOS	B											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 4: Van Slyke Ave & Como Ave

Control Type:	Two-way stop	Delay (sec / veh):	11.0
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.002

Intersection Setup

Name	Como Ave			Driveway			Van Slyke Ave			Van Slyke Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Como Ave			Driveway			Van Slyke Ave			Van Slyke Ave		
Base Volume Input [veh/h]	11	1	22	0	0	1	1	55	43	16	33	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.00	3.00	5.00	3.00	3.00	3.00	3.00	15.00	3.00	6.00	17.00	3.00
Growth Rate	1.14	1.03	1.14	1.03	1.03	1.03	1.03	1.14	1.14	1.14	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	1	25	0	0	1	1	63	49	18	34	2
Peak Hour Factor	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	0	8	0	0	0	0	21	16	6	11	1
Total Analysis Volume [veh/h]	17	1	33	0	0	1	1	84	65	24	45	3
Pedestrian Volume [ped/h]	22			1			1			4		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	10.55	10.98	9.42	10.33	10.90	8.55	7.32	0.00	0.00	7.71	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.20	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.04
95th-Percentile Queue Length [ft/ln]	5.12	5.12	5.12	0.07	0.07	0.07	0.05	0.05	0.05	1.01	1.01	1.01
d_A, Approach Delay [s/veh]	9.83			8.55			0.05			2.57		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	2.56											
Intersection LOS	B											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 5: Lexington Pkwy & Wynne Ave/Como Ave

Control Type:	Signalized	Delay (sec / veh):	31.4
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.719

Intersection Setup

Name	Lexington Pkwy			Lexington Pkwy			Wynne Ave			Como Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Pkwy			Lexington Pkwy			Wynne Ave			Como Ave		
Base Volume Input [veh/h]	43	637	54	21	504	12	15	4	58	65	1	45
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	7.00	3.00	8.00	3.00	3.00	10.00	3.00
Growth Rate	1.03	1.03	1.14	1.14	1.03	1.03	1.03	1.14	1.03	1.14	1.14	1.14
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	14	0	0	3	0	0	29	0	0	23
Total Hourly Volume [veh/h]	44	656	48	24	519	9	15	5	31	74	1	28
Peak Hour Factor	0.9010	0.9010	0.9010	0.9640	0.9640	0.9640	0.6590	0.6590	0.6590	0.6100	0.6100	0.6100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	12	182	13	6	135	2	6	2	12	30	0	11
Total Analysis Volume [veh/h]	49	728	53	25	538	9	23	8	47	121	2	46
Presence of On-Street Parking	No		No	No		No	No		No	No		Yes
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	1
Local Bus Stopping Rate [/h]	0	0	2	0	0	2	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			0			2			1		
v_di, Inbound Pedestrian Volume crossing m	2			1			2			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix E - Capacity Analysis Backup

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	1	6	0	0	2	0	0	4	0	0	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	7	20	0	0	20	0	0	10	0	0	10	0
Maximum Green [s]	20	50	0	0	50	0	0	35	0	0	35	0
Amber [s]	3.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0
All red [s]	1.5	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0
Split [s]	15	38	0	0	38	0	0	27	0	0	27	0
Vehicle Extension [s]	3.5	3.0	0.0	0.0	3.0	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Walk [s]	0	7	0	0	7	0	0	2	0	0	2	0
Pedestrian Clearance [s]	0	11	0	0	11	0	0	13	0	0	13	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.5	3.0	0.0	0.0	3.0	0.0	0.0	7.0	0.0	0.0	7.0	0.0
Minimum Recall	No	No			No			No			No	
Maximum Recall	No	No			No			No			No	
Pedestrian Recall	No	Yes			Yes			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Lane Group Calculations

Lane Group	L	C	L	C	C	R	C
C, Cycle Length [s]	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	9.00	9.00	9.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	2.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	3.00	7.00	7.00	7.00
g_i, Effective Green Time [s]	60	60	51	51	6	6	6
g / C, Green / Cycle	0.75	0.75	0.64	0.64	0.07	0.07	0.07
(v / s)_i Volume / Saturation Flow Rate	0.05	0.43	0.04	0.30	0.02	0.03	0.29
s, saturation flow rate [veh/h]	962	1818	686	1835	1597	1534	584
c, Capacity [veh/h]	717	1364	373	1167	198	115	121
d1, Uniform Delay [s]	3.68	4.37	14.31	7.55	34.88	35.30	39.48
k, delay calibration	0.13	0.50	0.50	0.50	0.08	0.08	0.10
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.05	1.75	0.35	1.35	0.27	1.74	189.68
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.07	0.57	0.07	0.47	0.16	0.41	1.40
d, Delay for Lane Group [s/veh]	3.73	6.12	14.66	8.90	35.15	37.04	229.16
Lane Group LOS	A	A	B	A	D	D	F
Critical Lane Group	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.14	4.28	0.30	4.48	0.57	0.91	8.85
50th-Percentile Queue Length [ft/ln]	3.57	107.05	7.48	111.97	14.35	22.82	221.29
95th-Percentile Queue Length [veh/ln]	0.26	7.68	0.54	7.95	1.03	1.64	15.12
95th-Percentile Queue Length [ft/ln]	6.43	191.90	13.46	198.74	25.82	41.08	378.04

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Movement, Approach, & Intersection Results

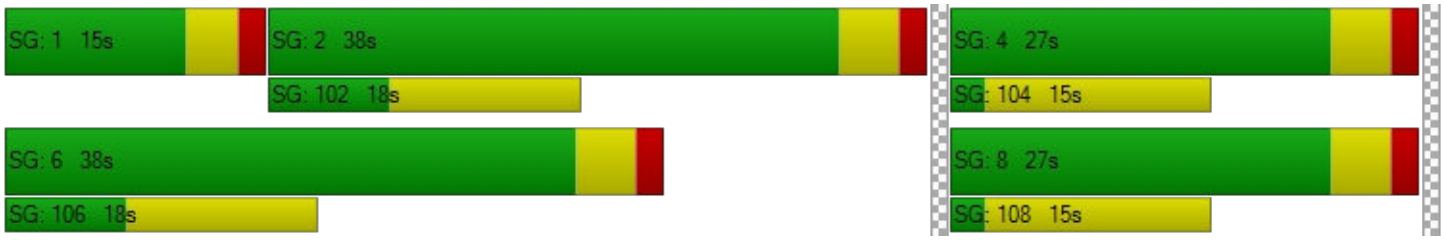
d_M, Delay for Movement [s/veh]	3.73	6.12	6.12	14.66	8.90	8.90	35.15	35.15	37.04	229.16	229.16	229.16
Movement LOS	A	A	A	B	A	A	D	D	D	F	F	F
d_A, Approach Delay [s/veh]	5.98			9.16			36.29			229.16		
Approach LOS	A			A			D			F		
d_I, Intersection Delay [s/veh]	31.39											
Intersection LOS	C											
Intersection V/C	0.719											

Other Modes

g_Walk,mi, Effective Walk Time [s]	6.0	6.0	11.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	3494.23	14062.50	3494.23	14019.72
M_CW, Crosswalk Circulation Area [ft²/ped]	958.66	5470.68	0.00	0.00
d_p, Pedestrian Delay [s]	34.23	34.23	29.76	29.76
l_p,int, Pedestrian LOS Score for Intersection	2.644	2.507	2.076	1.919
Crosswalk LOS	B	B	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	825	825	550	550
d_b, Bicycle Delay [s]	13.81	13.81	21.03	21.03
l_b,int, Bicycle LOS Score for Intersection	3.794	3.273	2.501	2.335
Bicycle LOS	D	C	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 6: Churchill St & Como Ave

Control Type:	Two-way stop	Delay (sec / veh):	11.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.005

Intersection Setup

Name	Churchill St			Churchill St			Como Ave			Como Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Churchill St			Churchill St			Como Ave			Como Ave		
Base Volume Input [veh/h]	7	0	1	8	2	9	12	52	7	2	87	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	15.00	10.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.03	1.03	1.03	1.03	1.09	1.09	1.14	1.09	1.03	1.14	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	0	1	8	2	10	13	59	8	2	99	6
Peak Hour Factor	0.7480	0.7480	0.7480	0.7480	0.7480	0.7480	0.7480	0.7480	0.7480	0.7480	0.7480	0.7480
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	0	3	1	3	4	20	3	1	33	2
Total Analysis Volume [veh/h]	11	0	1	11	3	13	17	79	11	3	132	8
Pedestrian Volume [ped/h]	7			16			7			5		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.02	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.74	11.13	8.91	10.76	11.23	9.51	7.69	0.00	0.00	7.44	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.06	0.06	0.06	0.12	0.12	0.12	0.03	0.03	0.03	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.40	1.40	1.40	2.93	2.93	2.93	0.73	0.73	0.73	0.10	0.10	0.10
d_A, Approach Delay [s/veh]	10.59			10.21			1.22			0.16		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	1.92											
Intersection LOS	B											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 7: Como Ave & West Parking Lot

Control Type:	Two-way stop	Delay (sec / veh):	10.9
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	West Parking Lot		Como Ave		Como Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	West Parking Lot		Como Ave		Como Ave	
Base Volume Input [veh/h]	1	10	5	57	74	3
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.11	1.11	1.11	1.14	1.14	1.11
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	2	7	10	-10	-7	4
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	18	16	55	77	7
Peak Hour Factor	0.7230	0.7230	0.7230	0.7230	0.7230	0.7230
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	6	6	19	27	2
Total Analysis Volume [veh/h]	4	25	22	76	107	10
Pedestrian Volume [ped/h]	70		0		0	

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.03	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.87	9.66	7.83	0.00	0.00	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.12	0.12	0.04	0.04	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.91	2.91	0.94	0.94	0.00	0.00
d_A, Approach Delay [s/veh]	9.83		1.76		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.87					
Intersection LOS	B					

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 8: Como Ave & Oxford St

Control Type:	Two-way stop	Delay (sec / veh):	11.6
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.028

Intersection Setup

Name	Oxford St		Como Ave		Como Ave	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Oxford St		Como Ave		Como Ave	
Base Volume Input [veh/h]	11	5	40	16	8	49
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.14	1.09	1.09	1.14
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	-8	0	0	-3
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	5	38	17	9	53
Peak Hour Factor	0.7710	0.7710	0.7710	0.7710	0.7710	0.7710
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	2	12	6	3	17
Total Analysis Volume [veh/h]	16	6	49	22	12	69
Pedestrian Volume [ped/h]	5		159		0	

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

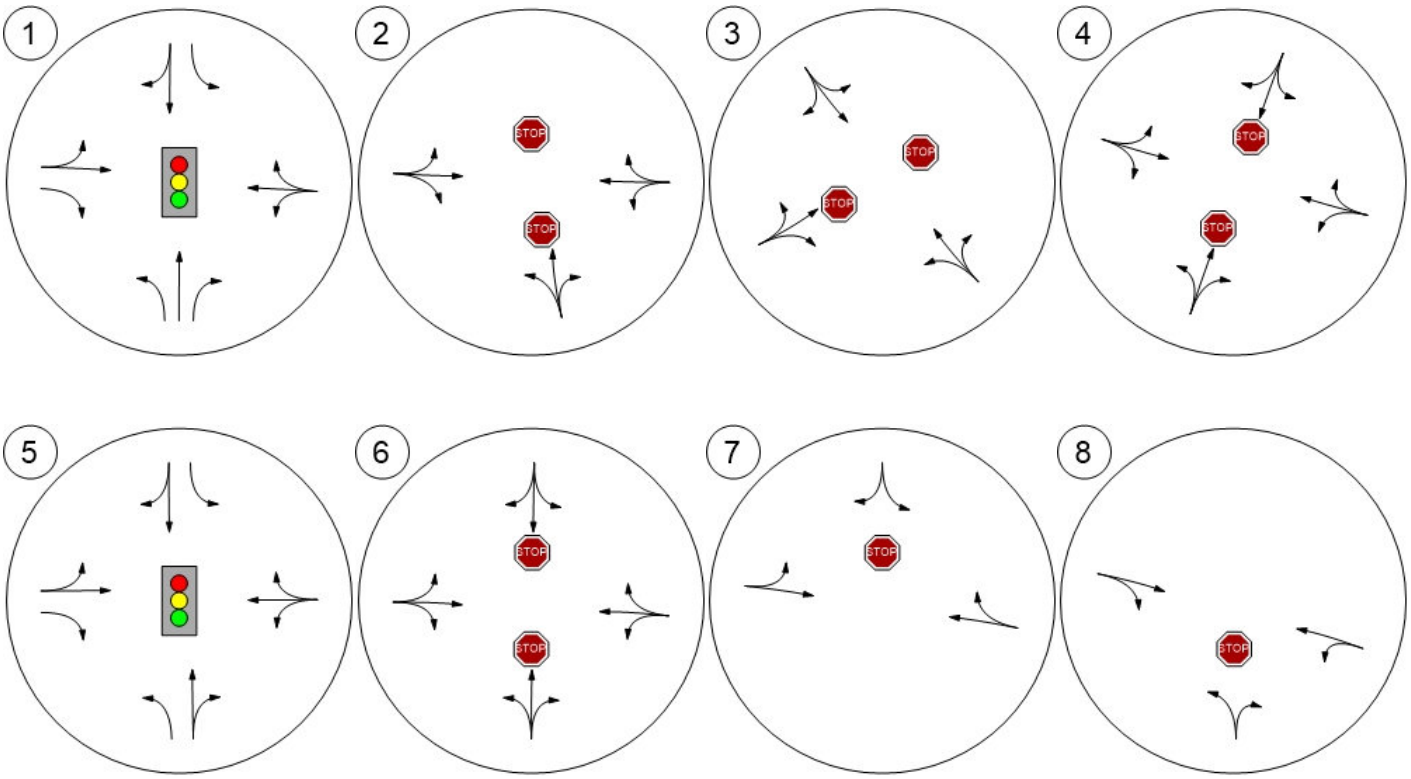
Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

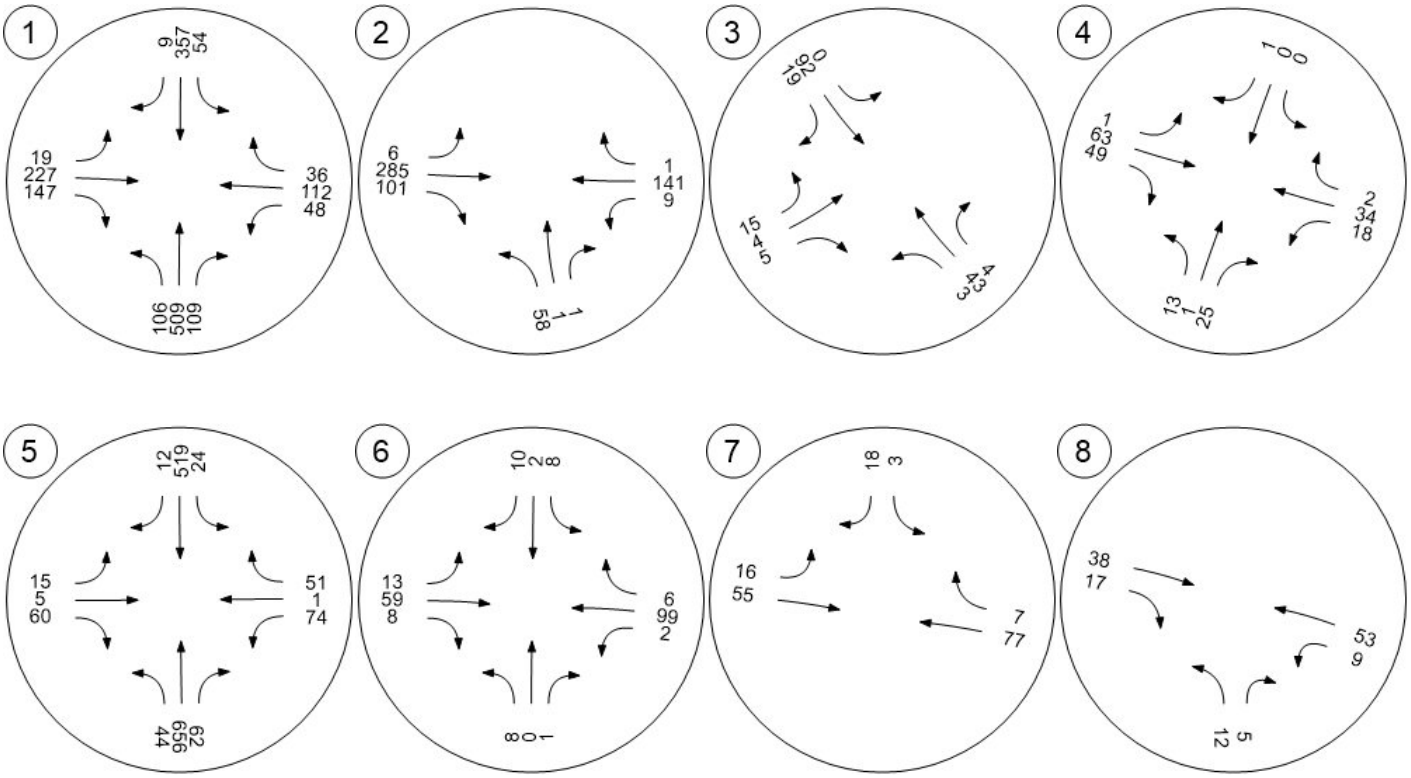
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.01	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	11.58	8.83	0.00	0.00	7.40	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.11	0.11	0.00	0.00	0.02	0.02
95th-Percentile Queue Length [ft/ln]	2.67	2.67	0.00	0.00	0.45	0.45
d_A, Approach Delay [s/veh]	10.83		0.00		1.10	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.88					
Intersection LOS	B					

Lane Configuration and Traffic Control



Traffic Volume - Future Total Volume



TCGIS

Vistro File: C:\...\TCGIS Vistro.vistro
Report File: C:\...\9 - PM 2023 with Alternatives.pdf

Scenario 9 PM Existing 2023 with Alts
11/30/2018

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Lexington Pkwy & Como Ave/Horton Ave	Signalized	HCM 6th Edition	WB Thru	0.669	26.0	C
2	Horton Ave & Van Slyke Ave	Two-way stop	HCM 6th Edition	NB Left	0.085	14.8	B
3	Van Slyke Ave & Churchill St	Two-way stop	HCM 6th Edition	NEB Thru	0.005	9.9	A
4	Van Slyke Ave & Como Ave	Two-way stop	HCM 6th Edition	NB Thru	0.001	9.9	A
5	Lexington Pkwy & Wynne Ave/Como Ave	Signalized	HCM 6th Edition	WB Left	0.699	11.1	B
6	Churchill St & Como Ave	Two-way stop	HCM 6th Edition	NB Thru	0.001	9.9	A
7	Como Ave & West Parking Lot	Two-way stop	HCM 6th Edition	SB Left	0.010	9.4	A
8	Como Ave & Oxford St	Two-way stop	HCM 6th Edition	NB Left	0.010	9.7	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 1: Lexington Pkwy & Como Ave/Horton Ave

Control Type:	Signalized	Delay (sec / veh):	26.0
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.669

Intersection Setup

Name	Lexington Pkwy			Lexington Pkwy			Como Ave			Horton Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	75.00	100.00	100.00	75.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Pkwy			Lexington Pkwy			Como Ave			Horton Ave		
Base Volume Input [veh/h]	123	669	87	37	377	15	33	278	140	32	126	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	6.00	3.00	3.00	3.00	3.00	3.00	3.00	8.00	4.00	4.00	10.00	3.00
Growth Rate	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	44	0	0	4	0	0	35	0	0	7
Total Hourly Volume [veh/h]	127	689	46	38	388	11	34	286	109	33	130	21
Peak Hour Factor	0.9610	0.9610	0.9610	0.8710	0.8710	0.8710	0.9110	0.9110	0.9110	0.9390	0.9390	0.9390
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	33	179	12	11	111	3	9	78	30	9	35	6
Total Analysis Volume [veh/h]	132	717	48	44	445	13	37	314	120	35	138	22
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	8	0	0	0
v_do, Outbound Pedestrian Volume crossing	4			1			2			1		
v_di, Inbound Pedestrian Volume crossing m	2			1			4			1		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	1	6	0	5	2	0	0	4	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	7	15	0	7	15	0	0	10	0	0	10	0
Maximum Green [s]	25	50	0	12	50	0	0	35	0	0	35	0
Amber [s]	3.0	3.5	0.0	3.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0
All red [s]	1.5	1.5	0.0	1.5	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0
Split [s]	12	36	0	12	36	0	0	32	0	0	32	0
Vehicle Extension [s]	3.5	3.0	0.0	2.3	3.0	0.0	0.0	4.5	0.0	0.0	4.5	0.0
Walk [s]	0	7	0	0	7	0	0	2	0	0	2	0
Pedestrian Clearance [s]	0	12	0	0	12	0	0	15	0	0	15	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.5	3.0	0.0	2.5	3.0	0.0	0.0	7.0	0.0	0.0	7.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	Yes		No	Yes			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Lane Group Calculations

Lane Group	L	C	R	L	C	C	R	C
C, Cycle Length [s]	80	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	9.00	9.00	9.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	0.00	3.00	7.00	7.00	7.00
g_i, Effective Green Time [s]	47	38	38	47	35	19	19	19
g / C, Green / Cycle	0.58	0.47	0.47	0.58	0.44	0.24	0.24	0.24
(v / s)_i Volume / Saturation Flow Rate	0.12	0.39	0.03	0.05	0.25	0.22	0.08	0.27
s, saturation flow rate [veh/h]	1065	1855	1577	882	1846	1604	1495	723
c, Capacity [veh/h]	583	872	741	401	815	441	365	230
d1, Uniform Delay [s]	9.24	18.32	11.59	12.05	16.58	28.85	24.83	27.13
k, delay calibration	0.13	0.50	0.50	0.50	0.50	0.19	0.19	0.19
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.24	8.62	0.17	0.55	2.79	5.56	0.89	14.22
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.23	0.82	0.06	0.11	0.56	0.80	0.33	0.85
d, Delay for Lane Group [s/veh]	9.48	26.94	11.76	12.60	19.37	34.41	25.73	41.35
Lane Group LOS	A	C	B	B	B	C	C	D
Critical Lane Group	No	Yes	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.95	12.45	0.47	0.35	6.42	6.90	1.91	3.97
50th-Percentile Queue Length [ft/ln]	23.83	311.29	11.84	8.76	160.39	172.49	47.70	99.35
95th-Percentile Queue Length [veh/ln]	1.72	18.24	0.85	0.63	10.57	11.21	3.43	7.15
95th-Percentile Queue Length [ft/ln]	42.90	455.96	21.31	15.77	264.24	280.18	85.85	178.84

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Movement, Approach, & Intersection Results

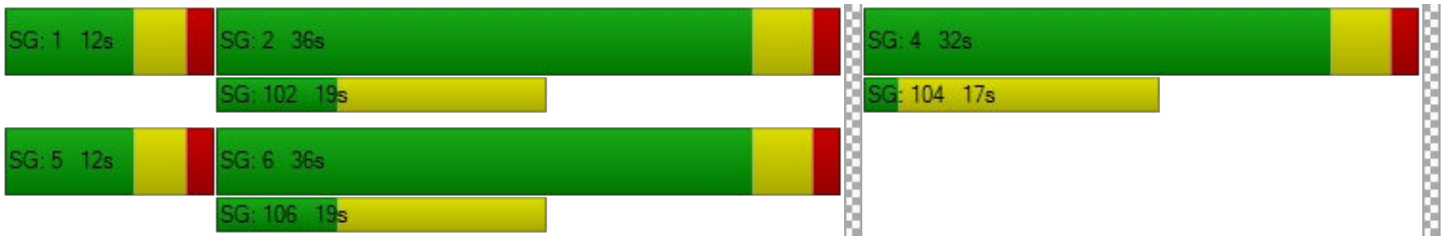
d_M, Delay for Movement [s/veh]	9.48	26.94	11.76	12.60	19.37	19.37	34.41	34.41	25.73	41.35	41.35	41.35
Movement LOS	A	C	B	B	B	B	C	C	C	D	D	D
d_A, Approach Delay [s/veh]	23.55			18.78			32.19			41.35		
Approach LOS	C			B			C			D		
d_I, Intersection Delay [s/veh]	26.04											
Intersection LOS	C											
Intersection V/C	0.669											

Other Modes

g_Walk,mi, Effective Walk Time [s]	6.0	6.0	11.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	2315.23	7009.86	2329.49	7009.86
M_CW, Crosswalk Circulation Area [ft²/ped]	852.74	3195.28	0.00	0.00
d_p, Pedestrian Delay [s]	34.23	34.23	29.76	29.76
l_p,int, Pedestrian LOS Score for Intersection	2.627	2.416	2.329	2.067
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	775	775	675	675
d_b, Bicycle Delay [s]	15.01	15.01	17.56	17.56
l_b,int, Bicycle LOS Score for Intersection	4.260	3.466	3.083	2.581
Bicycle LOS	E	C	C	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 2: Horton Ave & Van Slyke Ave

Control Type:	Two-way stop	Delay (sec / veh):	14.8
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.085

Intersection Setup

Name	Van Slyke Ave			Churchill St			Horton Ave			Horton Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Van Slyke Ave			Churchill St			Horton Ave			Horton Ave		
Base Volume Input [veh/h]	32	1	1	0	0	0	4	339	56	7	153	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	13.00	3.00	3.00	2.00	2.00	2.00	3.00	5.00	10.00	5.00	6.00	3.00
Growth Rate	1.03	1.03	1.03	1.00	1.00	1.00	1.03	1.03	1.03	1.03	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	33	1	1	0	0	0	4	349	58	7	158	2
Peak Hour Factor	0.9610	0.9610	0.9610	1.0000	1.0000	1.0000	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	0	0	0	0	0	1	91	15	2	41	1
Total Analysis Volume [veh/h]	34	1	1	0	0	0	4	363	60	7	164	2
Pedestrian Volume [ped/h]	2			3			1			2		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	14.81	14.54	11.41	0.00	0.00	0.00	7.58	0.00	0.00	8.25	0.00	0.00
Movement LOS	B	B	B				A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.29	0.29	0.29	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02
95th-Percentile Queue Length [ft/ln]	7.23	7.23	7.23	0.00	0.00	0.00	0.22	0.22	0.22	0.47	0.47	0.47
d_A, Approach Delay [s/veh]	14.70			0.00			0.07			0.33		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.97											
Intersection LOS	B											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 3: Van Slyke Ave & Churchill St

Control Type:	Two-way stop	Delay (sec / veh):	9.9
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.005

Intersection Setup

Name	Churchill St			Churchill St			Van Slyke Ave			Van Slyke Ave		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Churchill St			Churchill St			Van Slyke Ave			Van Slyke Ave		
Base Volume Input [veh/h]	5	4	1	0	0	0	1	29	5	0	55	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	15.00	3.00	2.00	2.00	2.00	17.00	15.00	4.00	30.00	10.00	15.00
Growth Rate	1.03	1.03	1.03	1.00	1.00	1.00	1.03	1.03	1.03	1.03	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	4	1	0	0	0	1	30	5	0	57	8
Peak Hour Factor	0.9250	0.9250	0.9250	1.0000	1.0000	1.0000	0.9250	0.9250	0.9250	0.9250	0.9250	0.9250
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	0	0	0	0	0	8	1	0	15	2
Total Analysis Volume [veh/h]	5	4	1	0	0	0	1	32	5	0	62	9
Pedestrian Volume [ped/h]	6			2			2			0		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.23	9.88	8.74	0.00	0.00	0.00	7.53	0.00	0.00	7.56	0.00	0.00
Movement LOS	A	A	A				A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.04	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.92	0.92	0.92	0.00	0.00	0.00	0.05	0.05	0.05	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.44			0.00			0.20			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	0.86											
Intersection LOS	A											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 4: Van Slyke Ave & Como Ave

Control Type:	Two-way stop	Delay (sec / veh):	9.9
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.001

Intersection Setup

Name	Como Ave			Driveway			Van Slyke Ave			Van Slyke Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Como Ave			Driveway			Van Slyke Ave			Van Slyke Ave		
Base Volume Input [veh/h]	8	1	23	1	1	1	2	36	14	8	23	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.00	3.00	5.00	3.00	3.00	3.00	3.00	15.00	3.00	6.00	17.00	3.00
Growth Rate	1.05	1.03	1.05	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	1	24	1	1	1	2	37	14	8	24	1
Peak Hour Factor	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	8	0	0	0	1	12	4	3	8	0
Total Analysis Volume [veh/h]	10	1	31	1	1	1	3	47	18	10	31	1
Pedestrian Volume [ped/h]	4			3			1			3		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	9.46	9.94	8.83	9.54	9.83	8.51	7.30	0.00	0.00	7.41	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.14	0.14	0.14	0.01	0.01	0.01	0.00	0.00	0.00	0.02	0.02	0.02
95th-Percentile Queue Length [ft/ln]	3.50	3.50	3.50	0.27	0.27	0.27	0.10	0.10	0.10	0.40	0.40	0.40
d_A, Approach Delay [s/veh]	9.01			9.29			0.32			1.77		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	3.24											
Intersection LOS	A											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 5: Lexington Pkwy & Wynne Ave/Como Ave

Control Type:	Signalized	Delay (sec / veh):	11.1
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.699

Intersection Setup

Name	Lexington Pkwy			Lexington Pkwy			Wynne Ave			Como Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Pkwy			Lexington Pkwy			Wynne Ave			Como Ave		
Base Volume Input [veh/h]	64	847	49	18	524	11	14	5	50	34	4	26
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	7.00	3.00	8.00	3.00	3.00	10.00	3.00
Growth Rate	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.05	1.05	1.05
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	12	0	0	3	0	0	25	0	0	7
Total Hourly Volume [veh/h]	66	872	38	19	540	8	14	5	27	36	4	20
Peak Hour Factor	0.9430	0.9430	0.9430	0.9000	0.9000	0.9000	0.6750	0.6750	0.6750	0.7500	0.7500	0.7500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	231	10	5	150	2	5	2	10	12	1	7
Total Analysis Volume [veh/h]	70	925	40	21	600	9	21	7	40	48	5	27
Presence of On-Street Parking	No		No	No		No	No		No	No		Yes
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	1
Local Bus Stopping Rate [/h]	0	0	2	0	0	2	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			1			6			1		
v_di, Inbound Pedestrian Volume crossing m	6			1			0			1		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	1	6	0	0	2	0	0	4	0	0	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	7	20	0	0	20	0	0	10	0	0	10	0
Maximum Green [s]	20	50	0	0	50	0	0	35	0	0	35	0
Amber [s]	3.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0	0.0	3.5	0.0
All red [s]	1.5	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0
Split [s]	15	38	0	0	38	0	0	27	0	0	27	0
Vehicle Extension [s]	3.5	3.0	0.0	0.0	3.0	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Walk [s]	0	7	0	0	7	0	0	2	0	0	2	0
Pedestrian Clearance [s]	0	11	0	0	11	0	0	13	0	0	13	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.5	3.0	0.0	0.0	3.0	0.0	0.0	7.0	0.0	0.0	7.0	0.0
Minimum Recall	No	No			No			No			No	
Maximum Recall	No	No			No			No			No	
Pedestrian Recall	No	Yes			Yes			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Lane Group Calculations

Lane Group	L	C	L	C	C	R	C
C, Cycle Length [s]	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	9.00	9.00	9.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	2.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	3.00	7.00	7.00	7.00
g_i, Effective Green Time [s]	62	62	51	51	5	5	5
g / C, Green / Cycle	0.77	0.77	0.64	0.64	0.06	0.06	0.06
(v / s)_i Volume / Saturation Flow Rate	0.08	0.53	0.04	0.33	0.02	0.03	0.17
s, saturation flow rate [veh/h]	932	1827	577	1835	1714	1494	468
c, Capacity [veh/h]	698	1403	289	1178	177	86	99
d1, Uniform Delay [s]	3.80	4.58	17.89	7.70	36.18	36.53	39.78
k, delay calibration	0.13	0.50	0.50	0.50	0.08	0.08	0.08
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.07	2.77	0.49	1.62	0.31	2.90	11.06
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.10	0.69	0.07	0.52	0.16	0.47	0.81
d, Delay for Lane Group [s/veh]	3.87	7.35	18.38	9.32	36.49	39.43	50.85
Lane Group LOS	A	A	B	A	D	D	D
Critical Lane Group	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.18	5.71	0.29	5.14	0.53	0.81	1.92
50th-Percentile Queue Length [ft/ln]	4.49	142.81	7.35	128.60	13.25	20.30	48.02
95th-Percentile Queue Length [veh/ln]	0.32	9.63	0.53	8.86	0.95	1.46	3.46
95th-Percentile Queue Length [ft/ln]	8.08	240.80	13.22	221.58	23.85	36.54	86.44

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Movement, Approach, & Intersection Results

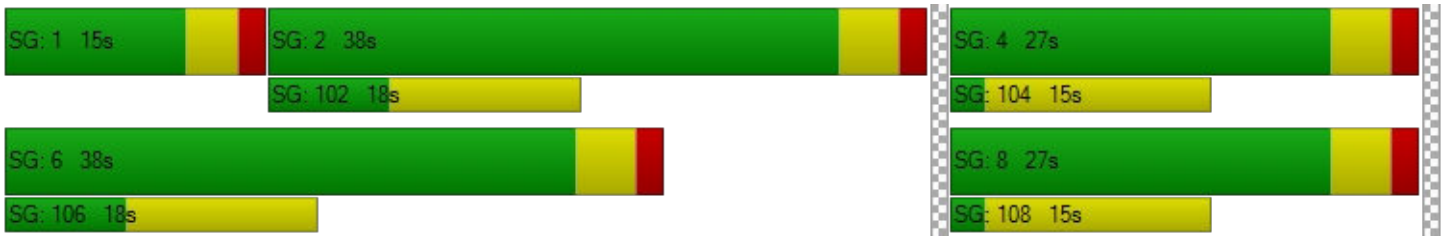
d_M, Delay for Movement [s/veh]	3.87	7.35	7.35	18.38	9.32	9.32	36.49	36.49	39.43	50.85	50.85	50.85
Movement LOS	A	A	A	B	A	A	D	D	D	D	D	D
d_A, Approach Delay [s/veh]	7.11			9.62			38.22			50.85		
Approach LOS	A			A			D			D		
d_I, Intersection Delay [s/veh]	11.08											
Intersection LOS	B											
Intersection V/C	0.699											

Other Modes

g_Walk,mi, Effective Walk Time [s]	6.0	6.0	11.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	2343.75	7009.86	2300.97	7009.86
M_CW, Crosswalk Circulation Area [ft²/ped]	889.50	2949.28	0.00	0.00
d_p, Pedestrian Delay [s]	34.23	34.23	29.76	29.76
l_p,int, Pedestrian LOS Score for Intersection	2.597	2.557	2.094	1.829
Crosswalk LOS	B	B	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	825	825	550	550
d_b, Bicycle Delay [s]	13.81	13.81	21.03	21.03
l_b,int, Bicycle LOS Score for Intersection	4.129	3.369	2.478	2.162
Bicycle LOS	D	C	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 6: Churchill St & Como Ave

Control Type:	Two-way stop	Delay (sec / veh):	9.9
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.001

Intersection Setup

Name	Churchill St			Churchill St			Como Ave			Como Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Churchill St			Churchill St			Como Ave			Como Ave		
Base Volume Input [veh/h]	13	1	1	3	1	4	5	53	7	0	45	3
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	15.00	10.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.05	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	1	1	3	1	4	5	55	7	0	47	3
Peak Hour Factor	0.9180	0.9180	0.9180	0.9180	0.9180	0.9180	0.9180	0.9180	0.9180	0.9180	0.9180	0.9180
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	0	0	1	0	1	1	15	2	0	13	1
Total Analysis Volume [veh/h]	14	1	1	3	1	4	5	60	8	0	51	3
Pedestrian Volume [ped/h]	4			3			2			2		

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.46	9.91	8.74	9.38	9.88	8.75	7.42	0.00	0.00	7.37	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.06	0.06	0.06	0.03	0.03	0.03	0.01	0.01	0.01	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.48	1.48	1.48	0.69	0.69	0.69	0.25	0.25	0.25	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.44			9.13			0.51			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	1.73											
Intersection LOS	A											

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 7: Como Ave & West Parking Lot

Control Type:	Two-way stop	Delay (sec / veh):	9.4
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

Intersection Setup

Name	West Parking Lot		Como Ave		Como Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	West Parking Lot		Como Ave		Como Ave	
Base Volume Input [veh/h]	2	9	3	51	38	3
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.11	1.11	1.11	1.05	1.05	1.11
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	5	10	12	-12	-10	3
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	20	15	42	30	6
Peak Hour Factor	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	6	4	12	9	2
Total Analysis Volume [veh/h]	8	23	17	48	34	7
Pedestrian Volume [ped/h]	16		0		0	

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.02	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.44	8.73	7.39	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.10	0.10	0.03	0.03	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.53	2.53	0.75	0.75	0.00	0.00
d_A, Approach Delay [s/veh]	8.92		1.93		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.93					
Intersection LOS	A					

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

Intersection Level Of Service Report
Intersection 8: Como Ave & Oxford St

Control Type:	Two-way stop	Delay (sec / veh):	9.7
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

Intersection Setup

Name	Oxford St		Como Ave		Como Ave	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Oxford St		Como Ave		Como Ave	
Base Volume Input [veh/h]	7	3	40	11	4	31
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.03	1.03	1.05	1.03	1.03	1.05
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	-7	0	0	-7
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	3	35	11	4	26
Peak Hour Factor	0.8770	0.8770	0.8770	0.8770	0.8770	0.8770
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	1	10	3	1	7
Total Analysis Volume [veh/h]	8	3	40	13	5	30
Pedestrian Volume [ped/h]	4		69		0	

Generated with PTV VISTRO
Version 6.00-02

Spack CONSULTING

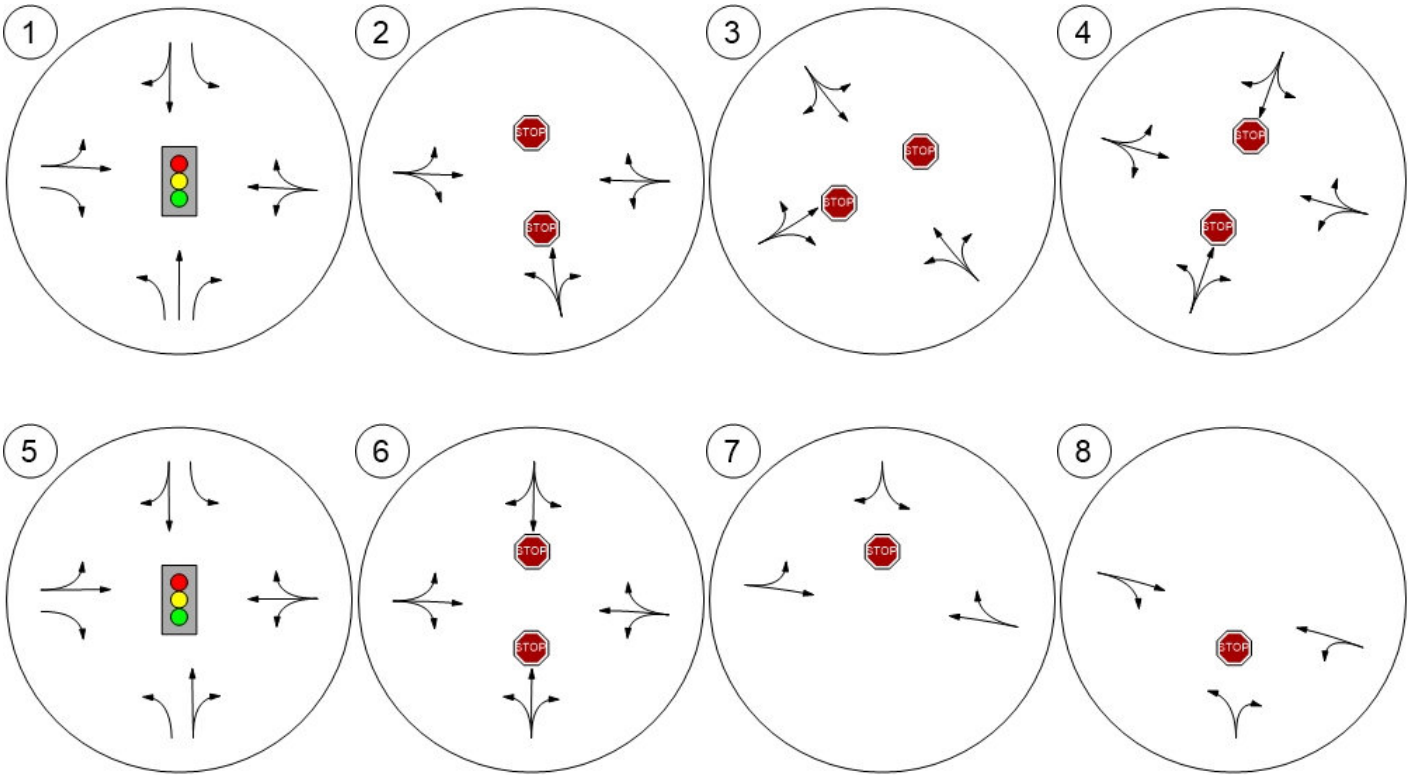
Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

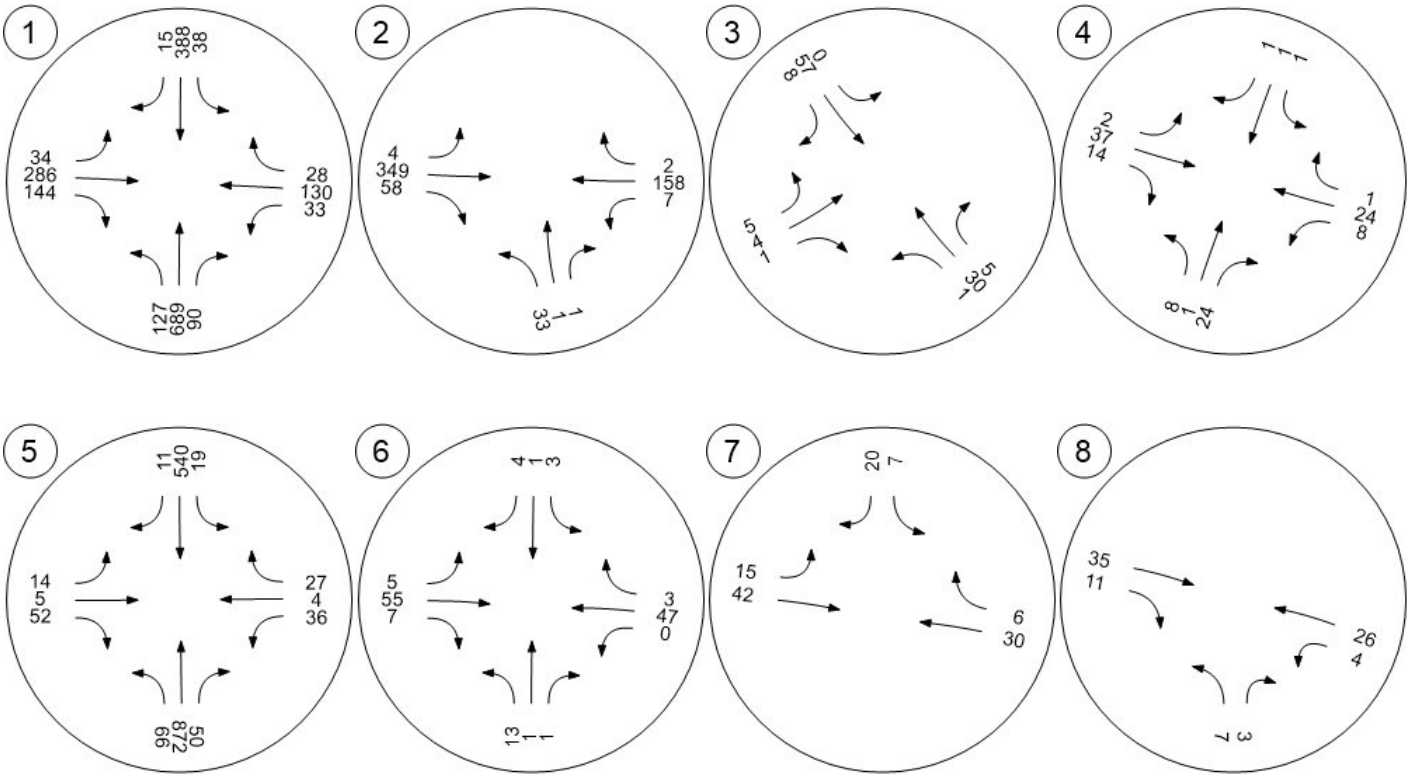
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.74	8.62	0.00	0.00	7.35	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.04	0.04	0.00	0.00	0.01	0.01
95th-Percentile Queue Length [ft/ln]	1.02	1.02	0.00	0.00	0.20	0.20
d_A, Approach Delay [s/veh]	9.44		0.00		1.05	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.42					
Intersection LOS	A					

Lane Configuration and Traffic Control



Traffic Volume - Future Total Volume



Building Use Agreement Between Mission Orthodox Presbyterian Church and Twin Cities German Immersion School

This building and parking lot use agreement is made by and between Mission Orthodox Presbyterian Church (“Mission,” hereafter), and Twin Cities German Immersion School ("TCGIS," hereafter). Mission hereby allows TCGIS and to use the premises (as defined below) for the term specified herein and subject to all of the terms and provisions set forth below:

1. PREMISES: The premises herein used are situated at 1040 Como Ave, Saint Paul, Minnesota 55103.

2.4 TERM: The term of this building use agreement shall be from and including August 20, 2018, to and including June 13, 2019 and shall terminate at 6 pm on such day.

3. USAGE: For September 2018-May 2019, TCGIS agrees to pay to Mission $2300 per month for use of:

- four pre-determined rooms in the education wing, 9:50-10:50 daily
- basement room with stage, 8-3:30 daily
- associated restrooms in the building for 1 hour per day
- other areas as needed and arranged for on an on-going basis; availability is not guaranteed by this contract

For the months of August 2018 & June 2019, TCGIS will pay the following prorated amounts:

August 20-31, 2018 (10 weekdays): $1150

June 2019 1-13 (9 weekdays): $1050

4. SECURITY DEPOSIT: A security deposit is not required.

5. USE OF PREMISES: TCGIS will use the property only as agreed to beforehand. As a general rule, the church building should be left in a condition at least as clean as when arrived. TCGIS agrees to use the rooms for educational purposes, consistent with its mission. TCGIS further agrees it will not conduct any illegal or immoral activities during its use of the rooms. Mission will provide reasonable WIFI access to its internet connection for educational purposes.

6. UTILITIES AND MAINTENANCE:

Utilities: Mission shall cover all utilities.

Maintenance: TCGIS agrees to be responsible for the cost of any repairs resulting from its use of the space, where such repair costs exceed normal maintenance costs. TCGIS

agrees to provide basic maintenance for the contracted rooms. This includes the following:

- Dump all trash in the used rooms
- Dump all trash in the used bathrooms
- Clean the floors as needed (particularly mopping the entryway on wet days)
- Clearing the snow from the entry sidewalk if Mission's contracted service has not done so before he students/staff arrive.
- Returning the room configuration to the pre-determined arrangement before leaving the building on the last school day before any weekend.

7. PARKING LOT USE

- TCGIS faculty and staff may use the OPC parking lot daily, 7 a.m. - 5 p.m.
- TCGIS will arrange and pay for snow removal for the OPC parking lot.
- TCGIS will leave an agreed upon number of spots open for OPC use upon request.
- OPC worshipers may use the TCGIS parking lot at 1031 Como Avenue for holiday, weekend and evening events.

8. INSURANCE & LIABILITY: Mission carries insurance for the entire building and grounds, including liability. TCGIS must carry their own policy for liability, and include Mission as an additional insured on the general, comprehensive liability insurance policy held by TCGIS.

9. BACKGROUND CHECKS: TCGIS shall conduct criminal background checks on each teacher or leader, and report the results of the background checks to Mission upon request. Mission has the right to review the background checks and refuse access due to a result of the background checks, if necessary.

10. RIGHT TO TERMINATE: If, in the reasonable judgement of either party, the other party does not comply with the terms of this Agreement, TCGIS and Mission reserve the right to terminate this Agreement and upon 30-day notice.

Mission and TCGIS, have executed this Agreement in two or more copies, each of which shall be considered an original, signed August 20, 2018.

_____ _____

Mission OPC officer or trustee TCGIS Representative

_____ _____

Date Date

City of Saint Paul – Department of Safety and Inspections
Site Plan Review Report
Date of Report: November 21, 2018
SPR File # 18-117556
Address Location: 1031 Como Ave.
Project: Twin Cities German Immersion School Addition

Ted Anderson
TC German Immersion School
1031 Como Ave.
St. Paul, MN 55103

Deb Rathman
Rivera Architects
775 Fairmount Ave.
St. Paul, MN 55105

Ben Ford
Rehder and Associates
3400 Federal Drive, Ste. 110
Eagan, MN 55122

On Tuesday, November 13, 2018, you met with City staff to discuss the site plan for a building addition for the Twin Cities German Immersion School at 1031 Como Avenue. The project includes demolition of the existing church structure on the site and east parking area, a three-level addition (including a gymnasium, classrooms, kitchen, and cafeteria), play area, and stormwater management. The comments from that meeting are summarized below.

1. **Site Plan Approval Process**
   a) Site Plan Review is a function delegated by the St Paul Planning Commission to City staff, however, a Site Plan may be referred to Planning Commission for public hearing.
   b) For this project the overall Site Plan will receive a public hearing at the Zoning Committee of the Planning Commission. The public hearing date is to be determined. The Planning Commission shall determine whether the submitted site plan is approved or denied per the findings in Leg. Code Sec. 61.402. - Site plan review by the planning commission (c) site plan review and approval.
   c) Planning Commission approval of the Site Plan must be obtained before staff can sign-off on the Site Plan.
   d) A Final Site Plan decision by the Planning Commission may be appealed within ten days after the date of the decision per Leg. Code Sec. 61.702 – Appeals to city council.
   e) Provide a pdf version of the updated Site Plan package for review by the Site Plan Review Committee prior to submittal to the Planning Commission.
   f) Per Minnesota State Statute 326, the final plans submitted shall be signed by the appropriate licensed Professional, i.e. PE, LA, RLS, etc., responsible for plan development.
   g) Building permits will not be issued until the Site Plan has final approval.

2. **Zoning**
   Reviewer: Tia Anderson/651-266-9086 tia.anderson@ci.stpaul.mn.us
   Reviewer: Amanda Smith 651-266-6507 amanda.smith@ci.stpaul.mn.us
   Comments:
   h) The proposed use of the property as a K-8 school is permitted at this location in an R4 One-family Residential Zoning District.
   i) *Update the Site Plan with the building setbacks and lot coverage calculation.* Applicable zoning dimensional and density standards for the proposed addition in a R4 zoning district are as follows:
      - 30’ maximum height and 3 stories. At the November 13, 2018, Site Plan Review Committee meeting the project indicated the building may be up to 34’ at the parapet. Building height in this district is measured to the top of the roof deck from average existing grade for a flat roof.
      - 25’ minimum front setback from Como Avenue.
      - 9’ minimum side yard setbacks along the east and west property lines.
      - Maximum lot coverage is 35%. In calculating the area of a lot that adjoins a dedicated public alley, for the purpose of applying lot area and density requirements, one-half the width of such alley adjoining the lot shall be considered as part of the lot.
   j) The off-street parking requirement for a K-8 school is one space per Full Time Equivalent employee.

- Based on expected FTEs, 86 off-street parking spaces are required (fractional spaces including .5 are disregarded). At the November 13, 2018, Site Plan Review Committee meeting the project indicated that 86.5 FTEs are expected as a result of the building addition (80.5 existing FTEs plus 6 additional).

- Bicycle parking may be substituted for up to 10% of minimum the off-street parking requirement, allowing for a decreased off-street parking requirement of 77 spaces (86 – 8.6 spaces). For the purpose of calculating a substitution, 4 spaces in a secure bicycle rack are the equivalent of one parking space.
- 25 off-street parking spaces are proposed. The property currently has 33 parking spaces (26 in west lot, 7 in east lot). The project is proposing to remove the east parking lot and re-stripe the west parking lot to include ADA parking, resulting in the loss of one parking space from the west lot.

k) If the minimum off-street parking requirement is not met, then the project may use one or more of the following to meet the requirement:
- Request of variance of the parking requirement through a public hearing process.
- Develop additional parking or re-configure the existing parking lot layout to provide the additional space needed. A site plan application which illustrates a parking arrangement that meets City parking standards is required.
- Provide additional parking through a shared parking agreement with a neighboring property. City staff will need to review and approve any shared parking agreement.

l) *As submitted, the Proposed Site Plan may require variances for: maximum building height; minimum off-street parking; maximum lot coverage.* Request for variances are typically considered by the Board of Zoning Appeals. However, The Planning and Zoning Administrators determined that any zoning variances for this project will be reviewed by the Zoning Committee of the Planning Commission at a public hearing. Decisions of the Planning Commission are appealable to the City Council. Allow at least 60 days to complete this process.

m) Update the Site Plan with a detail of the ADA parking signage. Parking spaces and passenger loading zones for persons with disabilities shall be designed in accordance with the provisions of the Accessibility Guidelines for Buildings and Facilities of the Americans with Disabilities Act (ADA).

n) *Update the Site Plan to indicate any compact parking spaces.* Accessory parking facilities may designate up to 50% of the spaces for compact cars only, in which case, the minimum layout dimensions may be reduced to 8' in width and 16' in length. Compact spaces shall be designated by signs with a minimum of one sign per every four compact spaces.

o) *Update the Site Plan to indicate number of proposed bicycle racks/spaces*. Bicycle parking shall be provided in a convenient, safe, and secure location. Off-street parking facilities shall provide a minimum of one secure bicycle parking space for every 20 motor vehicle parking spaces, disregarding fractional bicycle spaces.

p) At the November 13, 2018, Site Plan Review Committee meeting, the project team indicated that the existing trash and recycling enclosure will remain as-is at the rear of the west parking lot and alley.

3. **Building, Lighting and Landscaping Design Standards**

a) *Provide a pdf of each new building façade.* The paper plans submitted includes the West elevation where the electronic version omitted it.

b) The proposed building addition shall comply with building design standards per Leg. Code Sec. 63.110:

c) A primary entrance of principal structures shall be located within the front third of the structure; be delineated with elements such as roof overhangs, recessed entries, landscaping, or similar design features; and have a direct pedestrian connection to the street.

d) Building materials and architectural treatments used on sides of buildings facing an abutting public street should be similar to those used on principal facades.

e) *Provide the percentage of window and door openings on new facades on the Site Plan.* For principal buildings, above grade window and door openings shall comprise at least 15% of the total area of exterior walls facing a public street or sidewalk. Windows may be clear, translucent, or opaque.

f) *Provide a roof plan sheet.* The visual impact of rooftop equipment shall be reduced through such means as location, screening, or integration into the roof design. Screening shall be of durable, permanent materials that are compatible with the primary building materials. Exterior mechanical equipment such as ductwork shall not be located on primary building facades.

g) Exterior lighting shall meet Zoning Code Sec. 63.116. - Exterior lighting.
   - All outdoor lighting shall be shielded to reduce glare and shall be so arranged as to reflect lights away from all adjacent residential districts or adjacent residences in such a way as not to exceed three (3) footcandles measured at the residence district boundary.
   - *Update the Site Plan to indicate exterior lighting for the building addition or proposed play area.* All lighting in all districts used for the external illumination of buildings shall be placed and shielded so as not to interfere with the vision of persons on adjacent highways or adjacent property.

h) All required yards and any underdeveloped space shall be landscaped using materials such as trees, shrubs, sod, groundcover plants, or stormwater landscaping.

i) *An obscuring fence or other visual screen is recommended along the proposed play area on the east side of the property.* The existing fence encroaches into the alley right-of-way and should be relocated on private property. Though a fence is not required for the play area, the District Council has expressed a desire to screen the play area from neighboring residential properties and it may provide for child safety near the right-of-way.

4. **Signs**
   Reviewer: Ashley Skarda/651-266-9013 ashley.skarda@ci.stpaul.mn.us
   Comments:
   a) Business signs require a separate review and Sign Permit from the Department of Safety and Inspections. Site plan approval does not constitute approval of signs shown on the site plan. Contact Ashley Skarda of DSI Zoning regarding signs.
   b) Note that a sign variance for the number of signs was previously granted by the Board of Zoning Appeals (File #15-176769). Additional signage may require variance application and approval.

5. **Planning**
   Reviewer: Josh Williams/651-266- 6659 josh.williams@ci.stpaul.mn.us
   Comments:
   The Planning and Zoning Administrators determined that any zoning variances for this project will be reviewed by the Zoning Committee of the Planning Commission at a public hearing. The date of the public hearing is to be confirmed. Allow at least 60 days to complete this process. Decisions of the Planning Commission are appealable to the City Council.

6. **Heritage Preservation**
   Reviewer: Christine Boulware/651-266-6715 christine.boulware@ci.stpaul.mn.us
   Comments:
   The Saint Paul Heritage Preservation Commission, at a public hearing on November 5, 2018, voted that the former St. Andrew's Church is eligible for local heritage preservation designation. The nomination is being forwarded to the Planning Commission for their review and comment and to the State Historic Preservation Office. The HPC and Planning Commission will be making recommendations to the City Council in this designation process. If the church building is designated, the HPC would review all exterior work at the property.

7. **District Council**
   The site is located in the District 10 Community Council. A District Council representative attended the Site Plan Review Committee meeting and followed up with feedback via email. Please continue to work with the District Council, a community non-profit organization, to mitigate neighbor concerns.
   - The District Council expressed its desire to address the impact of playground noise on nearby residences (especially on the east and north sides of the property). Public Works indicated the fence on the east side of the property shall be removed from the alley right-of-way, which provides an excellent opportunity to look seriously at providing new sight and sound buffers to reduce the impact of playground noise.

8. **Parkland Dedication**
   Proposed use does not require payment of a Parkland Dedication fee.

9. **Public Works Records and Mapping**
   Contact Number: 651-266-6150
   Comments:
   No comment.

10. **Public Works Transportation Planning**
    Reviewer: David Kuebler/651-266-6217 david.kuebler@ci.stpaul.mn.us
    Reviewer: Colleen Paavola/651/266-6104 colleen.paavola@ci.stpaul.mn.us
    Comments:
    a) Please be advised that a Temporary Pedestrian Access Route (TPAR) and/or a Temporary Traffic Control (TTC) plan may be required as part of the Right-of-Way (ROW) permitting process. Said TTC or TPAR plans must be approved by the City prior to the ROW Permitting office issuing a permit(s).
    b) Per Minnesota State Statute 326, the final plans submitted must be signed by the appropriate licensed Professional, i.e. PE, LA, PLS, etc., responsible for plan development.
    c) Please clarify the "Retained Easement" for the vacated alley, as stated in the Survey plan sheet as document number 2216779, allows for buildings to be installed over the top.
    d) Please remove any encroachments of private property onto public rights-of-way and update the Removal Plan Sheet C0 accordingly. The Survey plan sheet shows a fence encroaching into the alley east of the property.
    e) Please verify that Xcel Energy poles are allowed to be on private property. The Survey plan sheet shows power poles west of the existing fence along the east alley.
    f) On Plan Sheet C0, please show removal of the outwalk adjacent to the driveway proposed for removal.
    g) Please provide a traffic impact study of the existing conditions and proposed improvements. Please contact David Kuebler at 651.266.6217 with questions regarding the study.

    h) Add the following notes to the plan sheets:
    - INSPECTION CONTACT: The developer shall contact the Right of Way inspector Dick Rohland at 651.485.1688 one week prior to beginning work to discuss traffic control, pedestrian safety and coordination of all work in the public right of way. Note: If a one week notice is not provided to the City, any resulting delays shall be the sole responsibility of the Contractor.
      As part of the ROW permitting process, two weeks before any work begins that impacts the ROW in any way the developer shall provide to the ROW Inspector the name and contact information of the Construction Project Manager or Construction Project Superintendent. If this information is not provided there may be a delay in obtaining permits for the work in the ROW. Said delays will be the sole responsibility of the developer
    - SAFE WORK SITE REQUIREMENTS: The Contractor shall provide a continuous, accessible and safe pedestrian walkway that meets ADA and MN MUTCD standards if working in a sidewalk area, and traffic control per MN MUTCD requirements for work in the public right of way.
    - ENCROACHMENTS: Per Chapter 134 of the Legislative Code, no person shall construct and maintain any projection or encroachment within the public right-of-way.
      Construction of the development that necessitates temporary use of the Right-of-Way (ROW) for construction purposes shall be limited to equipment, personnel, devices and appurtenances that are removable following construction. Encroachment permits will not be granted for devices such as tie backs, rock bolts, H-piles, lagging, timbers, sheet piling, etc. that the owner is seeking to abandon in the ROW.
      Section 3201.3 of the Minnesota Building Code defers final authority of encroachments into public rights-of-way/public property to the local authority. City Legislative Code governs management of the public rights-of-way. Provided such installations are approved by Public Works, footings may be allowed to encroach into City ROW no more than twelve (12) inches at depths below eight (8) feet as provided for in Minnesota Building Code Section 3202.1. Said

encroachments would require an encroachment permit from the City per Chapter 134 of the Legislative Code.
Encroachments installed in the ROW without authorization will be removed at no expense to the City/County/State.

- NO PRIVATE FACILITIES IN THE RIGHT OF WAY: The developer is strictly prohibited from installing private electrical wiring, conduit, receptacles and/or lighting in the City's Right of Way. This includes stubbing conduit or cable into the public right of way to accommodate utility feeds to the site. Coordinate with each utility prior to construction to determine feed points into the property. Utilities are responsible for securing excavation permits to run their service into a site, and (where required) submitting plans for review by the Public Works Utility Review Committee. The Contractor shall contact Don Bjorkman, General Foreman, Lighting - Signal Maintenance, (651-266-9780), if removal or relocation of existing facilities is required or in the event of damage to the lighting or signal utilities. The Contractor shall assume responsibility (and related costs) for any damage or relocations.
  Access to signal controller and lighting cabinets must be maintained at all times. If fencing is required for a job site, a key or other means of access must be provided to the City of St. Paul's Traffic Operations Department. Contact Don Bjorkman, General Foreman Signals and Lighting at 651.266.9780 for more information.
- ROADWAY RESTORATION: As per the City's "Standard Specification for Street Openings" policy, restoration on roadway surfaces less than 5 years old will require full width mill and overlay or additional degradation fees. Degradation fees are determined by contacting the Right of Way Service Desk at (651) 266-6151. Pavement restoration shall be completed by the St. Paul Public Works Street Maintenance Division. All related costs are the responsibility of the developer/contractor. Contact Street Maintenance at (651) 266-9700 for estimate of costs for pavement restoration.
- SIGNING: Signs regulating parking and/or traffic on private property shall be installed by the property owner or contractor outside of the public right-of-way (ROW). Removal of signs within the public ROW shall be completed by the City. New signs or the reinstallation of existing signs, as approved by Public Works Traffic Engineering, regulating parking and/or traffic in the public ROW for this development shall be installed by the City at the expense of the development. Contact Chris Gulden of Public Works 651-266-9778 two weeks in advance of needed sign work.
- STREET SWEEPING: Street sweeping is an important temporary erosion control best management practice and shall be performed with the use of water. Dry sweeping is prohibited. Additionally, trucks hauling in and out of the site, for any activity including but not necessarily limited to paving, excavation, etc., needs to ensure clean off all mud flaps to avoid any buildup on the street pavement.
- MISCELLANEOUS: Any infrastructure damage resulting from the contractors activities, incidental or otherwise, shall be repaired/replaced to the satisfaction of the City at no cost to the City.
- CITY OF ST. PAUL PERMIT REQUIREMENTS:
  - ORDERING OBSTRUCTION AND EXCAVATION PERMITS: Contact Public Works Right of Way Service Desk at (651) 266-6151. It is strongly recommended that contractors call for cost estimates prior to bidding to obtain accurate cost estimates.
  - OBSTRUCTION PERMITS: The contractor must obtain an Obstruction Permit if construction (including silt fences) will block City streets, sidewalks or alleys, or if driving over curbs.
  - EXCAVATION PERMITS: All digging in the public right of way requires an Excavation Permit. If the proposed building is close to the right of way, and excavating into the right of way is needed to facilitate construction, contact the utility inspector.
  - FAILURE TO SECURE PERMITS: Failure to secure Obstruction Permits or Excavation Permits will result in a double-permit fee and other fees required under City of St. Paul Legislative Codes.

11. **Public Works Sidewalks**
Reviewer: Al Czaia/651-266-6108 al.czaia@ci.stpaul.mn.us
Comments:
a) Contractor is responsible for damage to the mainline sidewalk, curb, drive access and boulevard landscaping cause during the construction. Contractor advised to document pre-existing condition of the right of way prior to commencement of the construction.
b) Sidewalk grades must be carried across driveways.

c) Update the Site Plan with the following notes:
- CONSTRUCTION IN RIGHT OF WAY: All work on curbs, driveways, and sidewalks within the public right of way must be done to City Standards and Specifications by a contractor licensed to work in the City right-of-way under a permit from Public Works Sidewalk Section (651-266-6108). Sidewalk grades must be carried across driveways.
- RIGHT OF WAY RESTORATION: Restoration of asphalt and concrete pavements are performed by the Public Works Street Maintenance Division. The contractor is responsible for payment to the City for the cost of these restorations. The contractor shall contact Public Works Street Maintenance to set up a work order prior to beginning any removals in the street at 651-266-9700. Procedures and unit costs are found in Street Maintenance's "General Requirements - All Restorations" and are available at the permit office.

12. **Public Works Sewers**
Reviewer: Anca Sima/651-266-6237 anca.sima@ci.stpaul.mn.us
Comments:
a) Existing sanitary service to the property is more than 50 years old, the pipe should be replaced up to the main.

b) Update the Site Plan with the following notes:
- SEWER REPAIR PERMIT: Plumbing Contractor to obtain “Repair Permits” from Public Works for proposed modification to the existing storm sewer connections. Call St Paul PW permit desk (651-266-6234) for information on obtaining this permit.
- SEWER REMOVAL/ABANDONMENT PERMIT for A53679 & a24638: Plumbing Contractor to obtain “Removal Permits” from Public Works to cut off existing sewer connections services to the property. Call St Paul PW permit desk (651-266-6234) for information on obtaining this permit.

13. **Water Quality/Erosion Control**
Reviewer: Wes Saunders-Pearce/651-266-9112 wes.saunders-pearce@ci.stpaul.mn.us
Comments:
Erosion control plan must show temporary inlet protection for area drains at parking lot and for protection of catch basin in public street.

14. **Water Utility**
Reviewer: Jeff Murphy / 651-266-6813 jeffrey.murphy@ci.stpaul.mn.us
Reviewer: Amanda Leier / 651-266-6276 amanda.leier@ci.stpaul.mn.us
Comments:
a) Confirm existing services from Van Slyke Ave are sufficient to serve existing building plus proposed addition.
b) The following work shall be performed by SPRWS on an actual cost basis. An estimate will be provided and payment in the amount of the estimate must be received before the work can be scheduled. Work of this type is currently being scheduled 4 to 6 weeks after payment and required signatures have been received:
- Cut off of existing unused water services at the main.
- Inspection of water facility work performed by owner’s contractor.
c) Plumbing permit applications to be made with SPRWS at 1900 Rice Street, Saint Paul, MN.
d) Provide completed project data sheets to determine meter sizing.

e) Furnish one set of interior fire suppression mechanical plans for review and approval by SPRWS plumbing inspection unit.
f) Furnish one set of revised site plans for review. Following approval by SPRWS, furnish one set of approved plans.

g) Update the Site Plan with the following NOTES:
- A four-sided trench box is required on all excavations deeper than 5 feet where underground work or inspection is to be performed by SPRWS. Ladders are required and must extend 3 feet above the surface of the trench. Sidewalks, pavements, ducts and appurtenant structures shall not be undermined unless a support system or another method of protection is provided. Trenches in excess of 20 feet in depth must be signed off by a registered professional engineer. Excavated material must be kept a minimum of 2 feet from the edge of the trench.
- All water service valve boxes within construction area must be exposed and brought to grade upon completion of construction.
- All pipe work inside of property to be performed by a plumber licensed by the State of Minnesota and Certified by the City of Saint Paul. SPRWS requires separate outside and inside plumbing permits for each new water service.
- Water facility pipework within right of way to be installed by SPRWS. Excavation and restoration by owner's contractor.
- The contractor providing excavation is responsible for obtaining all excavation and obstruction permits required by any governing authority.

15. **Fire**

Reviewer: Ann Blaser/651-266-9140 ann.blaser@ci.stpaul.mn.us

Comments:

a) Automatic Fire Sprinkler System Required. Plans and permits required by licensed contractor. Flow test is required to determine adequacy of water service for proposed fire suppression system. The fire prevention section of the Dept. of Safety and Inspections reviews sprinkler plans, issues permits and does the necessary inspections of the installation. Contact Jeff Hemenway 651-266-8952 with questions on obtaining this permit and the procedure for arranging a time to perform this test.
b) Visibility of the Fire Department connection must be maintained in a visible, accessible location at all times without obstruction by fences, bushes, trees, walls, or other objects for a minimum of 3 feet to the front and each side. This requirement is applicable for the duration of the construction time as well.

c) Update the Site Plan with the following notes:
- Contractor to maintain access to the fire department connection for fire department personnel at all times during the construction period.

16. **City Forestry**

Reviewer: Zach Jorgensen/651-632-2437 zach.jorgensen@ci.stpaul.mn.us

Comments:

a) Existing street trees are to be protected at all times. Trees damaged or removed during construction shall be restored or replaced to the satisfaction of, and at no cost to, the City as determined by the Forestry manager.
b) Sheet C0: Demo Plan
- Tree protection fencing is required around the existing street trees on Como Avenue. Show this on the plan sheet and include a tree protection fence detail in the plan set.
- Along with demolition note one, all base materials under pavements in the boulevard area are to be removed.

c) Sheet L1: Landscape Plan
- One new street tree is required where the driveway is removed on Como Avenue. Tree to be a New Horizon Elm, 2.5" caliper
- Update the tree planting detail to include the following notes:

- Expose root flare and set at grade.
- Remove burlap and ropes from top 1/3rd of root ball, cut wire basket down to second horizontal wire from the bottom, and dispose of off-site.
- Contractor is responsible to maintain trees in a plumb position throughout the maintenance period.

d) Update the Landscape Plan with the following notes:
- The removal, pruning, and/or planting of trees on the public boulevard requires an approved permit from the City Forester (651-632-2437). Any work must be completed by a licensed tree contractor.
- Street trees shall be protected by establishing a tree protection zone using 4' tall fencing installed at the drip line of the tree. Tree protection fencing shall be installed prior to the start of any site work and maintained for the duration of the project. Proposed work within, or changes to the location of tree protection fencing shall be reviewed by the City Forester prior to alteration.

17. **Parks and Recreation**
Reviewer: Paul Sawyer/651-266-6417 paul.sawyer@ci.stpaul.mn.us
Comments:
No comments

18. **Plumbing**
Reviewer: Rick Jacobs/651-266-9051 rick.jacobs@ci.stpaul.mn.us
Comments:

a) Contact Saint Paul Regional Water Services (SPRWS) for questions, permits, fees, inspections, specifications, plans, or information that may be required for the water service and/or the water meter.
b) Sanitary and/or storm sewer service passing within 10 feet of the building are governed by the MN Plumbing Code. Specification for pipe material selection and notes for required air test of the piping, compliant with MN State Plumbing Code 4714 Section 1109.0, must be shown on the plan. This system must be reviewed and approved by Rick Jacobs, Senior Plumbing Inspector (651-266-9051) to ensure that it meets Plumbing Code standards.
c) Contact the City of Saint Paul Department of Public Works Sewer Division for questions, permits, fees, inspections, specifications, plans, or information that may be required for sewer and storm piping work performed outside the building, including retention systems located outside the building.

d) Update the Arch., Civil, Mech.and Site Plan with the following notes:
- All primary roof drains shall be connected to the storm sewer. MPC 4714.1101.1.
- Secondary Roof Drainage shall drain to an approved place of disposal in the form Secondary Roof Drains installed per MPC 4714.1101 & 1102, and Minnesota State Building Code 1503.4 1-5. Secondary roof drainage must discharge onto permeable soils and cannot drain onto the sidewalk. MPC 4714.1101.1. Both primary and secondary roof drainage systems must meet this requirement. Minnesota has specific requirements to address seasonal conditions of freeze and thaw when the discharge from roof drains could create unsafe, icy conditions on sidewalk. A proper point of discharge that can be approved by the Authority Having Jurisdiction for secondary roof drainage is in the form of secondary roof drains piped internally, down to within 18 inches of grade, through the outside wall, onto a splash block installed per MPC 1101.5.3, and laid over permeable soils of an adequate amount where saturation of the soil will not occur.

19. **Building Code Requirements**
Reviewer: James Williamette/651-266-9077 james.williamette@ci.stpaul.mn.us
Comments:

a) This proposal will require a building permit to proceed. The building permit is issued only after all necessary city staff have approved and signed off on the proposed design. In addition to the building permit, separate permits are required for any plumbing, electrical and mechanical work,

elevator installation and any fire sprinkler modifications. These permits must be obtained and the work performed by city licensed contractors in each of the respective trades.

b) One PDF and two sets of complete construction documents stamped by public works must be submitted with the building permit application to the DSI Main Office/ Permit Desk.
   - The construction documents shall include architectural, structural, mechanical, electrical and plumbing plans signed and stamped by design professionals registered in the State of Minnesota, The architect shall provide a complete code analysis and a color-coded exit plan showing all fire rated walls and shafts and include exit access and travel distances. The plans shall have the energy code noted on the plans along with the compliance path chosen. The submittal should include compliance documents detailing how the energy code requirements are met.
   - Plans must be dimensioned, drawn to scale and sufficiently detailed to denote the scope of work to be performed and the method of construction.
   - Mechanical ventilation plans will need to be prepared by a mechanical engineer, registered with the State of Minnesota. In some cases, a "Master in the Trade" may prepare plans. The ventilation contractor should contact our senior warm air inspector Gary Reinsberg (651-266-9064) or by e-mail at Gary.reinsberg@ci.stpaul.mn.us The Energy code and path must be noted on these plans also.
   - The plumbing and electrical contractors for this project should contact our office if they have questions about whether engineered plans need to be submitted with their permit request. The senior plumbing inspector is Rick Jacobs at 651-266-9051 Rick.jacobs@ci.stpaul.mn.us and the senior electrical inspector is Dan Moynihan at 651-266-9036 Dan.monihan@ci.stpaul.mn.us

Note: **The building permit will not be issued until all signoffs are received** from Zoning, HPC, HVAC, Public Works, or other departments that are assigned to the project.

20. **Service Availability Charge (SAC)**
The proposed project will need a SAC determination before a building permit can be issued. You must submit a copy of the plans to the Metropolitan Council Environmental Services (MCES) for a SAC determination. Please see their website at https://metrocouncil.org for additional information. If MCES determines that a SAC fee is due, the City will collect that payment with the building permit fee.
SAC Questions and Determination Review Submittal Information email:
SACprogram@metc.state.mn.us or call 651-602-1770 to speak to a SAC representative.

Report Prepared By:

Tia Anderson
Senior City Planner

cc: File, Site Plan Review Staff, HPC Staff, City Council Ward 5 Office, District 10 Planning Council

City of Saint Paul – Department of Safety and Inspections
Site Plan Review Report
Date of Report: November 21, 2018
SPR File # 18-117556
Address Location: 1031 Como Ave.
Project: Twin Cities German Immersion School Addition

Ted Anderson
TC German Immersion School
1031 Como Ave.
St. Paul, MN 55103

Deb Rathman
Rivera Architects
775 Fairmount Ave.
St. Paul, MN 55105

Ben Ford
Rehder and Associates
3400 Federal Drive, Ste. 110
Eagan, MN 55122

SEE BELOW FOR DESIGN TEAM COMMENTS IN RED

On Tuesday, November 13, 2018, you met with City staff to discuss the site plan for a building addition for the Twin Cities German Immersion School at 1031 Como Avenue. The project includes demolition of the existing church structure on the site and east parking area, a three-level addition (including a gymnasium, classrooms, kitchen, and cafeteria), play area, and stormwater management. The comments from that meeting are summarized below.

1. **Site Plan Approval Process**
   a) Site Plan Review is a function delegated by the St Paul Planning Commission to City staff, however, a Site Plan may be referred to Planning Commission for public hearing.
   b) For this project the overall Site Plan will receive a public hearing at the Zoning Committee of the Planning Commission. The public hearing date is to be determined. The Planning Commission shall determine whether the submitted site plan is approved or denied per the findings in Leg. Code Sec. 61.402. - Site plan review by the planning commission (c) site plan review and approval.
   c) Planning Commission approval of the Site Plan must be obtained before staff can sign-off on the Site Plan.
   d) A Final Site Plan decision by the Planning Commission may be appealed within ten days after the date of the decision per Leg. Code Sec. 61.702 – Appeals to city council.
   e) Provide a pdf version of the updated Site Plan package for review by the Site Plan Review Committee prior to submittal to the Planning Commission.
   f) Per Minnesota State Statute 326, the final plans submitted shall be signed by the appropriate licensed Professional, i.e. PE, LA, RLS, etc., responsible for plan development.
   g) Building permits will not be issued until the Site Plan has final approval.

2. **Zoning**
   Reviewer: Tia Anderson/651-266-9086 tia.anderson@ci.stpaul.mn.us
   Reviewer: Amanda Smith 651-266-6507 amanda.smith@ci.stpaul.mn.us
   Comments:
   h) The proposed use of the property as a K-8 school is permitted at this location in an R4 One-family Residential Zoning District.
   i) *Update the Site Plan with the building setbacks and lot coverage calculation.* Applicable zoning dimensional and density standards for the proposed addition in a R4 zoning district are as follows:
      - 30’ maximum height and 3 stories. At the November 13, 2018, Site Plan Review Committee meeting the project indicated the building may be up to 34’ at the parapet. Building height in this district is measured to the top of the roof deck from average existing grade for a flat roof. Elevations revised to measure to top of roof deck. New average height is 33’ above grade. See revised Variance Description and elevations
      - 25’ minimum front setback from Como Avenue.
        Setback minimum met – see revised civil plans
      - 9’ minimum side yard setbacks along the east and west property lines.
        Setback minimum met – see revised civil plans

- Maximum lot coverage is 35%. In calculating the area of a lot that adjoins a dedicated public alley, for the purpose of applying lot area and density requirements, one-half the width of such alley adjoining the lot shall be considered as part of the lot.
  Maximum lot coverage recalculated to include area of one-half width of adjoining public alley's. This decreases the lot coverage percentage to 36%.
  See revised Variance Description

j) The off-street parking requirement for a K-8 school is one space per Full Time Equivalent employee.
   - Based on expected FTEs, 86 off-street parking spaces are required (fractional spaces including .5 are disregarded). At the November 13, 2018, Site Plan Review Committee meeting the project indicated that 86.5 FTEs are expected as a result of the building addition (80.5 existing FTEs plus 6 additional).
     Parking counts and relative information updated.
     See revised Variance Description

   - Bicycle parking may be substituted for up to 10% of minimum the off-street parking requirement, allowing for a decreased off-street parking requirement of 77 spaces (86 – 8.6 spaces). For the purpose of calculating a substitution, 4 spaces in a secure bicycle rack are the equivalent of one parking space.

     36 spaces for bicycle parking are proposed for the site.
     See revised Variance Description

   - 25 off-street parking spaces are proposed. The property currently has 33 parking spaces (26 in west lot, 7 in east lot). The project is proposing to remove the east parking lot and re-stripe the west parking lot to include ADA parking, resulting in the loss of one parking space from the west lot.
     See revised civil plans
     See revised Variance Description

k) If the minimum off-street parking requirement is not met, then the project may use one or more of the following to meet the requirement:
   - Request of variance of the parking requirement through a public hearing process.
     Variance requested
   - Develop additional parking or re-configure the existing parking lot layout to provide the additional space needed. A site plan application which illustrates a parking arrangement that meets City parking standards is required.
   - Provide additional parking through a shared parking agreement with a neighboring property. City staff will need to review and approve any shared parking agreement.
     Shared parking agreement with neighboring property

l) *As submitted, the Proposed Site Plan may require variances for: maximum building height; minimum off-street parking; maximum lot coverage.* Request for variances are typically considered by the Board of Zoning Appeals. However, The Planning and Zoning Administrators determined that any zoning variances for this project will be reviewed by the Zoning Committee of the Planning Commission at a public hearing. Decisions of the Planning Commission are appealable to the City Council. Allow at least 60 days to complete this process.
   Variance requested

m) *Update the Site Plan with a detail of the ADA parking signage*. Parking spaces and passenger loading zones for persons with disabilities shall be designed in accordance with the provisions of the Accessibility Guidelines for Buildings and Facilities of the Americans with Disabilities Act (ADA).

   An ADA parking signage detail (5/C3) was added.

n) *Update the Site Plan to indicate any compact parking spaces.* Accessory parking facilities may designate up to 50% of the spaces for compact cars only, in which case, the minimum layout dimensions may be reduced to 8' in width and 16' in length. Compact spaces shall be designated by signs with a minimum of one sign per every four compact spaces.

No compact parking spaces are proposed.

o) *Update the Site Plan to indicate number of proposed bicycle racks/spaces*. Bicycle parking shall be provided in a convenient, safe, and secure location. Off-street parking facilities shall provide a minimum of one secure bicycle parking space for every 20 motor vehicle parking spaces, disregarding fractional bicycle spaces.

There are 36 bicycle parking spaces on the site. The calculations supporting the number of proposed spots can be found on sheet C1.

p) At the November 13, 2018, Site Plan Review Committee meeting, the project team indicated that the existing trash and recycling enclosure will remain as-is at the rear of the west parking lot and alley.
Trash and recycling enclosure will remain "as is"

3. **Building, Lighting and Landscaping Design Standards**

a) *Provide a pdf of each new building façade.* The paper plans submitted includes the West elevation where the electronic version omitted it.
Elevations updated and provided in paper and electronic versions.

b) The proposed building addition shall comply with building design standards per Leg. Code Sec. 63.110:
Addition complies with design standards. See elevations and plans

c) A primary entrance of principal structures shall be located within the front third of the structure; be delineated with elements such as roof overhangs, recessed entries, landscaping, or similar design features; and have a direct pedestrian connection to the street.
Entrances delineated with architectural features and appropriately located.

d) Building materials and architectural treatments used on sides of buildings facing an abutting public street should be similar to those used on principal facades.
Materials and treatments similar to principal building structures.

e) *Provide the percentage of window and door openings on new facades on the Site Plan.* For principal buildings, above grade window and door openings shall comprise at least 15% of the total area of exterior walls facing a public street or sidewalk. Windows may be clear, translucent, or opaque.
Percentages provided for all elevations

f) *Provide a roof plan sheet.* The visual impact of rooftop equipment shall be reduced through such means as location, screening, or integration into the roof design. Screening shall be of durable, permanent materials that are compatible with the primary building materials. Exterior mechanical equipment such as ductwork shall not be located on primary building facades.
Roof plan provided

g) Exterior lighting shall meet Zoning Code Sec. 63.116. - Exterior lighting.
- All outdoor lighting shall be shielded to reduce glare and shall be so arranged as to reflect lights away from all adjacent residential districts or adjacent residences in such a way as not to exceed three (3) footcandles measured at the residence district boundary.
- *Update the Site Plan to indicate exterior lighting for the building addition or proposed play area.*

All lighting in all districts used for the external illumination of buildings shall be placed and shielded so as not to interfere with the vision of persons on adjacent highways or adjacent property.

No new lighting is proposed for the east or west facades. The existing entrance lighting will remain as-is. There will be recessed can lights in the canopy over the new south doors.

h) All required yards and any underdeveloped space shall be landscaped using materials such as trees, shrubs, sod, groundcover plants, or stormwater landscaping.

Noted.

i) *An obscuring fence or other visual screen is recommended along the proposed play area on the east side of the property.* The existing fence encroaches into the alley right-of-way and should be relocated on private property. Though a fence is not required for the play area, the District Council has expressed a desire to screen the play area from neighboring residential properties and it may provide for child safety near the right-of-way.

The existing wood fence will be relocated to within the property. The chain link fence, where it encroaches, will also be relocated to within the property. These items are shown on the demolition and site plans.

4. **Signs**
Reviewer: Ashley Skarda/651-266-9013 ashley.skarda@ci.stpaul.mn.us
Comments:
a) Business signs require a separate review and Sign Permit from the Department of Safety and Inspections. Site plan approval does not constitute approval of signs shown on the site plan. Contact Ashley Skarda of DSI Zoning regarding signs.
b) Note that a sign variance for the number of signs was previously granted by the Board of Zoning Appeals (File #15-176769). Additional signage may require variance application and approval.

5. **Planning**
Reviewer: Josh Williams/651-266- 6659 josh.williams@ci.stpaul.mn.us
Comments:
The Planning and Zoning Administrators determined that any zoning variances for this project will be reviewed by the Zoning Committee of the Planning Commission at a public hearing. The date of the public hearing is to be confirmed. Allow at least 60 days to complete this process. Decisions of the Planning Commission are appealable to the City Council.

6. **Heritage Preservation**
Reviewer: Christine Boulware/651-266-6715 christine.boulware@ci.stpaul.mn.us
Comments:
The Saint Paul Heritage Preservation Commission, at a public hearing on November 5, 2018, voted that the former St. Andrew's Church is eligible for local heritage preservation designation. The nomination is being forwarded to the Planning Commission for their review and comment and to the State Historic Preservation Office. The HPC and Planning Commission will be making recommendations to the City Council in this designation process. If the church building is designated, the HPC would review all exterior work at the property.

7. **District Council**
The site is located in the District 10 Community Council. A District Council representative attended the Site Plan Review Committee meeting and followed up with feedback via email. Please continue to work with the District Council, a community non-profit organization, to mitigate neighbor concerns.

- The District Council expressed its desire to address the impact of playground noise on nearby residences (especially on the east and north sides of the property). Public Works indicated the fence on the east side of the property shall be removed from the alley right-of-way, which provides an excellent opportunity to look seriously at providing new sight and sound buffers to reduce the impact of playground noise.

  Noted and as previously mentioned, the fences are being relocated.

8. **Parkland Dedication**
   Proposed use does not require payment of a Parkland Dedication fee.

9. **Public Works Records and Mapping**
   Contact Number: 651-266-6150
   Comments:
   No comment.

10. **Public Works Transportation Planning**
    Reviewer: David Kuebler/651-266-6217 david.kuebler@ci.stpaul.mn.us
    Reviewer: Colleen Paavola/651/266-6104 colleen.paavola@ci.stpaul.mn.us
    Comments:
    a) Please be advised that a Temporary Pedestrian Access Route (TPAR) and/or a Temporary Traffic Control (TTC) plan may be required as part of the Right-of-Way (ROW) permitting process. Said TTC or TPAR plans must be approved by the City prior to the ROW Permitting office issuing a permit(s).

       Noted.

    b) Per Minnesota State Statute 326, the final plans submitted must be signed by the appropriate licensed Professional, i.e. PE, LA, PLS, etc., responsible for plan development.

       Noted.

    c) Please clarify the "Retained Easement" for the vacated alley, as stated in the Survey plan sheet as document number 2216779, allows for buildings to be installed over the top.

       As discussed with David Kuebler, the applicant is aware of the retained easements. The retained easements existed as part of the previous building project and were noted by the title company. The owner may pursue the vacation of the easements as to clean up the parcel.

    d) Please remove any encroachments of private property onto public rights-of-way and update the Removal Plan Sheet C0 accordingly. The Survey plan sheet shows a fence encroaching into the alley east of the property.

       Fences are now proposed to be relocated.

    e) Please verify that Xcel Energy poles are allowed to be on private property. The Survey plan sheet shows power poles west of the existing fence along the east alley.

       As discussed with David Kuebler, it is not unusual to have power poles encroaching on private property. The Owner is aware of the condition, but recognizes the uphill battle required to move them.

    f) On Plan Sheet C0, please show removal of the outwalk adjacent to the driveway proposed for removal.

While we recognize this request, we see the walk as another location for accessible drop-offs and would like to leave it in place. If this is not possible, we will show removing it with the next plan set.

g) Please provide a traffic impact study of the existing conditions and proposed improvements. Please contact David Kuebler at 651.266.6217 with questions regarding the study.

A Traffic Impact Study has been commissioned and an existing conditions TIS Memo with appendices is attached. The final TIS report will be provided to the city by 12/7.

h) Add the following notes to the plan sheets:

- INSPECTION CONTACT: The developer shall contact the Right of Way inspector Dick Rohland at 651.485.1688 one week prior to beginning work to discuss traffic control, pedestrian safety and coordination of all work in the public right of way. Note: If a one week notice is not provided to the City, any resulting delays shall be the sole responsibility of the Contractor.
  As part of the ROW permitting process, two weeks before any work begins that impacts the ROW in any way the developer shall provide to the ROW Inspector the name and contact information of the Construction Project Manager or Construction Project Superintendent. If this information is not provided there may be a delay in obtaining permits for the work in the ROW. Said delays will be the sole responsibility of the developer
- SAFE WORK SITE REQUIREMENTS: The Contractor shall provide a continuous, accessible and safe pedestrian walkway that meets ADA and MN MUTCD standards if working in a sidewalk area, and traffic control per MN MUTCD requirements for work in the public right of way.
- ENCROACHMENTS: Per Chapter 134 of the Legislative Code, no person shall construct and maintain any projection or encroachment within the public right-of-way.
  Construction of the development that necessitates temporary use of the Right-of-Way (ROW) for construction purposes shall be limited to equipment, personnel, devices and appurtenances that are removable following construction. Encroachment permits will not be granted for devices such as tie backs, rock bolts, H-piles, lagging, timbers, sheet piling, etc. that the owner is seeking to abandon in the ROW.
  Section 3201.3 of the Minnesota Building Code defers final authority of encroachments into public rights-of-way/public property to the local authority. City Legislative Code governs management of the public rights-of-way. Provided such installations are approved by Public Works, footings may be allowed to encroach into City ROW no more than twelve (12) inches at depths below eight (8) feet as provided for in Minnesota Building Code Section 3202.1. Said encroachments would require an encroachment permit from the City per Chapter 134 of the Legislative Code.
  Encroachments installed in the ROW without authorization will be removed at no expense to the City/County/State.
- NO PRIVATE FACILITIES IN THE RIGHT OF WAY: The developer is strictly prohibited from installing private electrical wiring, conduit, receptacles and/or lighting in the City's Right of Way. This includes stubbing conduit or cable into the public right of way to accommodate utility feeds to the site. Coordinate with each utility prior to construction to determine feed points into the property. Utilities are responsible for securing excavation permits to run their service into a site, and (where required) submitting plans for review by the Public Works Utility Review Committee. The Contractor shall contact Don Bjorkman, General Foreman, Lighting - Signal Maintenance, (651-266-9780), if removal or relocation of existing facilities is required or in the event of damage to the lighting or signal utilities. The Contractor shall assume responsibility (and related costs) for any damage or relocations.
  Access to signal controller and lighting cabinets must be maintained at all times. If fencing is required for a job site, a key or other means of access must be provided to the City of St. Paul's Traffic Operations Department. Contact Don Bjorkman, General Foreman Signals and Lighting at 651.266.9780 for more information.

- ROADWAY RESTORATION: As per the City's "Standard Specification for Street Openings" policy, restoration on roadway surfaces less than 5 years old will require full width mill and overlay or additional degradation fees. Degradation fees are determined by contacting the Right of Way Service Desk at (651) 266-6151. Pavement restoration shall be completed by the St. Paul Public Works Street Maintenance Division. All related costs are the responsibility of the developer/contractor. Contact Street Maintenance at (651) 266-9700 for estimate of costs for pavement restoration.
- SIGNING: Signs regulating parking and/or traffic on private property shall be installed by the property owner or contractor outside of the public right-of-way (ROW). Removal of signs within the public ROW shall be completed by the City. New signs or the reinstallation of existing signs, as approved by Public Works Traffic Engineering, regulating parking and/or traffic in the public ROW for this development shall be installed by the City at the expense of the development. Contact Chris Gulden of Public Works 651-266-9778 two weeks in advance of needed sign work.
- STREET SWEEPING: Street sweeping is an important temporary erosion control best management practice and shall be performed with the use of water. Dry sweeping is prohibited. Additionally, trucks hauling in and out of the site, for any activity including but not necessarily limited to paving, excavation, etc., needs to ensure clean off all mud flaps to avoid any buildup on the street pavement.
- MISCELLANEOUS: Any infrastructure damage resulting from the contractors activities, incidental or otherwise, shall be repaired/replaced to the satisfaction of the City at no cost to the City.
- CITY OF ST. PAUL PERMIT REQUIREMENTS:
    - ORDERING OBSTRUCTION AND EXCAVATION PERMITS: Contact Public Works Right of Way Service Desk at (651) 266-6151. It is strongly recommended that contractors call for cost estimates prior to bidding to obtain accurate cost estimates.
    - OBSTRUCTION PERMITS: The contractor must obtain an Obstruction Permit if construction (including silt fences) will block City streets, sidewalks or alleys, or if driving over curbs.
    - EXCAVATION PERMITS: All digging in the public right of way requires an Excavation Permit. If the proposed building is close to the right of way, and excavating into the right of way is needed to facilitate construction, contact the utility inspector.
    - FAILURE TO SECURE PERMITS: Failure to secure Obstruction Permits or Excavation Permits will result in a double-permit fee and other fees required under City of St. Paul Legislative Codes.

These notes were added to sheet C2.

11. **Public Works Sidewalks**
Reviewer: Al Czaia/651-266-6108 al.czaia@ci.stpaul.mn.us
Comments:

a) Contractor is responsible for damage to the mainline sidewalk, curb, drive access and boulevard landscaping cause during the construction. Contractor advised to document pre-existing condition of the right of way prior to commencement of the construction.
b) Sidewalk grades must be carried across driveways.

Noted.

c) Update the Site Plan with the following notes:
- CONSTRUCTION IN RIGHT OF WAY: All work on curbs, driveways, and sidewalks within the public right of way must be done to City Standards and Specifications by a contractor licensed to work in the City right-of-way under a permit from Public Works Sidewalk Section (651-266-6108). Sidewalk grades must be carried across driveways.
- RIGHT OF WAY RESTORATION: Restoration of asphalt and concrete pavements are performed by the Public Works Street Maintenance Division. The contractor is responsible for payment to the City for the cost of these restorations. The contractor shall contact Public Works Street Maintenance to set up a work order prior to beginning any removals in the street at 651-266-9700. Procedures and unit costs are found in Street Maintenance's "General Requirements - All Restorations" and are available at the permit office.

These two notes were added to sheet C2.

12. **Public Works Sewers**
Reviewer: Anca Sima/651-266-6237 anca.sima@ci.stpaul.mn.us
Comments:

a) Existing sanitary service to the property is more than 50 years old, the pipe should be replaced up to the main.

The existing sanitary sewer is now shown being replaced.

b) Update the Site Plan with the following notes:
- SEWER REPAIR PERMIT: Plumbing Contractor to obtain “Repair Permits” from Public Works for proposed modification to the existing storm sewer connections. Call St Paul PW permit desk (651-266-6234) for information on obtaining this permit.
- SEWER REMOVAL/ABANDONMENT PERMIT for A53679 & a24638: Plumbing Contractor to obtain “Removal Permits” from Public Works to cut off existing sewer connections services to the property. Call St Paul PW permit desk (651-266-6234) for information on obtaining this permit.

These two notes were added to sheet C2.

13. **Water Quality/Erosion Control**
Reviewer: Wes Saunders-Pearce/651-266-9112 wes.saunders-pearce@ci.stpaul.mn.us
Comments:
Erosion control plan must show temporary inlet protection for area drains at parking lot and for protection of catch basin in public street.

Inlet protection devices were added to the three area drains east of the proposed addition and to the existing catch basin on the south side of Como Avenue.

14. **Water Utility**
Reviewer: Jeff Murphy / 651-266-6813 jeffrey.murphy@ci.stpaul.mn.us
Reviewer: Amanda Leier / 651-266-6276 amanda.leier@ci.stpaul.mn.us
Comments:

a) Confirm existing services from Van Slyke Ave are sufficient to serve existing building plus proposed addition.

The contractor thinks there will likely be a need for an additional fire suppression service off of Como and it has been added to the plans.

b) The following work shall be performed by SPRWS on an actual cost basis. An estimate will be provided and payment in the amount of the estimate must be received before the work can be scheduled. Work of this type is currently being scheduled 4 to 6 weeks after payment and required signatures have been received:
- Cut off of existing unused water services at the main.
- Inspection of water facility work performed by owner's contractor.

Noted.

c) Plumbing permit applications to be made with SPRWS at 1900 Rice Street, Saint Paul, MN.
d) Provide completed project data sheets to determine meter sizing.
e) Furnish one set of interior fire suppression mechanical plans for review and approval by SPRWS plumbing inspection unit.
f) Furnish one set of revised site plans for review. Following approval by SPRWS, furnish one set of approved plans.

g) Update the Site Plan with the following NOTES:
- A four-sided trench box is required on all excavations deeper than 5 feet where underground work or inspection is to be performed by SPRWS. Ladders are required and must extend 3 feet above the surface of the trench. Sidewalks, pavements, ducts and appurtenant structures shall not be undermined unless a support system or another method of protection is provided. Trenches in excess of 20 feet in depth must be signed off by a registered professional engineer. Excavated material must be kept a minimum of 2 feet from the edge of the trench.
- All water service valve boxes within construction area must be exposed and brought to grade upon completion of construction.
- All pipe work inside of property to be performed by a plumber licensed by the State of Minnesota and Certified by the City of Saint Paul. SPRWS requires separate outside and inside plumbing permits for each new water service.
- Water facility pipework within right of way to be installed by SPRWS. Excavation and restoration by owner's contractor.
- The contractor providing excavation is responsible for obtaining all excavation and obstruction permits required by any governing authority.

These five notes were added to sheet C2.

15. **Fire**
Reviewer: Ann Blaser/651-266-9140 ann.blaser@ci.stpaul.mn.us
Comments:

a) Automatic Fire Sprinkler System Required. Plans and permits required by licensed contractor. Flow test is required to determine adequacy of water service for proposed fire suppression system. The fire prevention section of the Dept. of Safety and Inspections reviews sprinkler plans, issues permits and does the necessary inspections of the installation. Contact Jeff Hemenway 651-266-8952 with questions on obtaining this permit and the procedure for arranging a time to perform this test.

b) Visibility of the Fire Department connection must be maintained in a visible, accessible location at all times without obstruction by fences, bushes, trees, walls, or other objects for a minimum of 3 feet to the front and each side. This requirement is applicable for the duration of the construction time as well.

c) Update the Site Plan with the following notes:
- Contractor to maintain access to the fire department connection for fire department personnel at all times during the construction period.

This note was added to sheet C2.

16. **City Forestry**
Reviewer: Zach Jorgensen/651-632-2437 zach.jorgensen@ci.stpaul.mn.us
Comments:

a) Existing street trees are to be protected at all times. Trees damaged or removed during construction shall be restored or replaced to the satisfaction of, and at no cost to, the City as determined by the Forestry manager.

b) Sheet C0: Demo Plan
- Tree protection fencing is required around the existing street trees on Como Avenue. Show this on the plan sheet and include a tree protection fence detail in the plan set.
  A tree protection detail 7/C3 was added. Silt fence is also shown around the three trees on sheet C0 near Como Avenue.
- Along with demolition note one, all base materials under pavements in the boulevard area are to be removed.
  This note was added to sheet C0.

c) Sheet L1: Landscape Plan
- One new street tree is required where the driveway is removed on Como Avenue. Tree to be a New Horizon Elm, 2.5" caliper
- Update the tree planting detail to include the following notes:
  - Expose root flare and set at grade.
  - Remove burlap and ropes from top 1/3rd of root ball, cut wire basket down to second horizontal wire from the bottom, and dispose of off-site.
  - Contractor is responsible to maintain trees in a plumb position throughout the maintenance period.

d) Update the Landscape Plan with the following notes:
- The removal, pruning, and/or planting of trees on the public boulevard requires an approved permit from the City Forester (651-632-2437). Any work must be completed by a licensed tree contractor.
- Street trees shall be protected by establishing a tree protection zone using 4' tall fencing installed at the drip line of the tree. Tree protection fencing shall be installed prior to the start of any site work and maintained for the duration of the project. Proposed work within, or changes to the location of tree protection fencing shall be reviewed by the City Forester prior to alteration.

These two notes were also added to sheet C2.

17. **Parks and Recreation**
Reviewer: Paul Sawyer/651-266-6417 paul.sawyer@ci.stpaul.mn.us
Comments:
No comments

18. **Plumbing**
Reviewer: Rick Jacobs/651-266-9051 rick.jacobs@ci.stpaul.mn.us
Comments:

a) Contact Saint Paul Regional Water Services (SPRWS) for questions, permits, fees, inspections, specifications, plans, or information that may be required for the water service and/or the water meter.
b) Sanitary and/or storm sewer service passing within 10 feet of the building are governed by the MN Plumbing Code. Specification for pipe material selection and notes for required air test of the piping, compliant with MN State Plumbing Code 4714 Section 1109.0, must be shown on the plan. This system must be reviewed and approved by Rick Jacobs, Senior Plumbing Inspector (651-266-9051) to ensure that it meets Plumbing Code standards.
c) Contact the City of Saint Paul Department of Public Works Sewer Division for questions, permits, fees, inspections, specifications, plans, or information that may be required for sewer and storm piping work performed outside the building, including retention systems located outside the building.

d) Update the Arch., Civil, Mech.and Site Plan with the following notes:
   - All primary roof drains shall be connected to the storm sewer. MPC 4714.1101.1.
   - Secondary Roof Drainage shall drain to an approved place of disposal in the form Secondary Roof Drains installed per MPC 4714.1101 & 1102, and Minnesota State Building Code 1503.4 1-5. Secondary roof drainage must discharge onto permeable soils and cannot drain onto the sidewalk. MPC 4714.1101.1. Both primary and secondary roof drainage systems must meet this requirement. Minnesota has specific requirements to address seasonal conditions of freeze and thaw when the discharge from roof drains could create unsafe, icy conditions on sidewalk. A proper point of discharge that can be approved by the Authority Having Jurisdiction for secondary roof drainage is in the form of secondary roof drains piped internally, down to within 18 inches of grade, through the outside wall, onto a splash block installed per MPC 1101.5.3, and laid over permeable soils of an adequate amount where saturation of the soil will not occur.

   These two notes were added to sheet C2.

19. **Building Code Requirements**
Reviewer: James Williamette/651-266-9077 james.williamette@ci.stpaul.mn.us
Comments:

a) This proposal will require a building permit to proceed. The building permit is issued only after all necessary city staff have approved and signed off on the proposed design. In addition to the building permit, separate permits are required for any plumbing, electrical and mechanical work, elevator installation and any fire sprinkler modifications. These permits must be obtained and the work performed by city licensed contractors in each of the respective trades.
b) One PDF and two sets of complete construction documents stamped by public works must be submitted with the building permit application to the DSI Main Office/ Permit Desk.
   - The construction documents shall include architectural, structural, mechanical, electrical and plumbing plans signed and stamped by design professionals registered in the State of Minnesota, The architect shall provide a complete code analysis and a color-coded exit plan showing all fire rated walls and shafts and include exit access and travel distances. The plans shall have the energy code noted on the plans along with the compliance path chosen. The submittal should include compliance documents detailing how the energy code requirements are met.
   - Plans must be dimensioned, drawn to scale and sufficiently detailed to denote the scope of work to be performed and the method of construction.
   - Mechanical ventilation plans will need to be prepared by a mechanical engineer, registered with the State of Minnesota. In some cases, a “Master in the Trade” may prepare plans. The ventilation contractor should contact our senior warm air inspector Gary Reinsberg (651-266-9064) or by e-mail at Gary.reinsberg@ci.stpaul.mn.us The Energy code and path must be noted on these plans also.

- The plumbing and electrical contractors for this project should contact our office if they have questions about whether engineered plans need to be submitted with their permit request. The senior plumbing inspector is Rick Jacobs at 651-266-9051 Rick.jacobs@ci.stpaul.mn.us and the senior electrical inspector is Dan Moynihan at 651-266-9036 Dan.monihan@ci.stpaul.mn.us

Note: **The building permit will not be issued until all signoffs are received** from Zoning, HPC, HVAC, Public Works, or other departments that are assigned to the project.

20. **Service Availability Charge (SAC)**
The proposed project will need a SAC determination before a building permit can be issued. You must submit a copy of the plans to the Metropolitan Council Environmental Services (MCES) for a SAC determination. Please see their website at https://metrocouncil.org for additional information. If MCES determines that a SAC fee is due, the City will collect that payment with the building permit fee.
SAC Questions and Determination Review Submittal Information email:
SACprogram@metc.state.mn.us or call 651-602-1770 to speak to a SAC representative.

Report Prepared By:

Tia Anderson
Senior City Planner

cc: File, Site Plan Review Staff, HPC Staff, City Council Ward 5 Office, District 10 Planning Council

DEPARTMENT OF SAFETY AND INSPECTIONS
Ricardo X. Cervantes, Director

CITY OF SAINT PAUL

375 Jackson Street, Suite 220
St Paul, Minnesota 55101-1806

Telephone: 651-266-8989
Facsimile: 651-266-9124
Web: www.stpaul.gov/dsi

December 13, 2018

Ted Anderson
TC German Immersion School
1031 Como Ave.
St. Paul, MN 55103

Deb Rathman
Rivera Architects
775 Fairmount Ave.
St. Paul, MN 55105

Ben Ford
Rehder and Associates
3400 Federal Drive, Ste. 110
Eagan, MN 55122

RE: **Updated Site Plan 18-117556** – Twin Cities German Immersion School Addition at 1031 Como Ave – Site Plans with revisions through 11/29/2018.

Ted Anderson, Deb Rathman, and Ben Ford,

Below is a summary of outstanding comments for the Twin Cities German Immersion School addition Site Plan:

General Comments

1. The site plan and zoning variances for building height, lot coverage and minimum off-street parking will be reviewed by the Zoning Committee of the Planning Commission at a public hearing on December 20, 2018. The Zoning Committee's recommendation will be given to the Planning Commission for a vote at their December 28, 2018 meeting. Decisions of the Planning Commission are appealable to the City Council.
2. Per Minnesota State Statute 326, the final plans submitted are signed by the appropriate licensed Professional, i.e. PE, LA, RLS, etc., responsible for plan development.
3. Final plans should not be marked "preliminary" or "not for construction."

Zoning

Tia Anderson/651-266-9086 tia.anderson@ci.stpaul.mn.us

4. Update the Site Plan to indicate any existing bicycle parking to remain on site.
5. Update the Site Plan to include both the minimum bicycle parking (1 space) and the proposed excess bicycle parking (36 spaces). The minimum required bicycle parking is one secure bicycle parking space for every 20 motor vehicle parking spaces. As well, the project is proposing to include additional bicycle parking as allowed for up to a 10% off-street parking reduction.
6. Update C1 Site Plan to reflect the anticipated number of staff FTEs. The Variance application indicates up to 86.5 FTEs.

7. The property owner has agree in principle a Shared Building Use and Parking Agreement for off-street parking spaces with the church at 1040 Como Ave. The zoning administrator may authorize a reduction in the total number of required parking spaces for two or more uses jointly providing off-street parking when their respective hours of peak operation do not overlap.
    - An application for shared parking shall be submitted to the Department of Safety and Inspections for review and approval. The zoning administrator may impose reasonable conditions to mitigate potential negative effects of a shared parking agreement.
    - Parties to a shared parking agreement shall submit an annual statement to the zoning administrator which verifies the non-concurrent peak parking hours of the buildings involved with the shared parking agreement and a list of uses within each building to verify no changes have occurred that would require additional parking.
    - The shared parking facility shall be clearly designated with an identification sign.
8. The site plan updated 11/29/2018 includes salvaging and locating the existing fence within the east property line. Based on feedback from the District Council and general neighbor complaints regarding noise, staff recommends the fence be replaced with a durable, obscuring fence at least 6' in height. Any fence will need to meet site line requirements for vehicles using the alley.

Public Works Transportation Planning

David Kuebler/651-266-6217 david.kuebler@ci.stpaul.mn.us

9. On Plan Sheet C0, please show removal of the outwalk adjacent to the driveway proposed for removal.
10. Staff is reviewing the updated Traffic Impact Study received on Dec 11, 2018. Any comments will be forthcoming in a separate communication.

Public Works Sewers

Anca Sima/651-266-6237 anca.sima@ci.stpaul.mn.us

11. Update the Site Plan Notes per the November 21, 2018, Committee Report for both A53679 and A24638:
    - SEWER REMOVAL/ABANDONMENT PERMIT for A53679 & a24638: Plumbing Contractor to obtain "Removal Permits" from Public Works to cut off existing sewer connections services to the property. Call St Paul PW permit desk (651-266-6234) for information on obtaining this permit.
12. Provide Public Work Sewers the autoCAD for the utility plan once the Site Plan is approved.

Water Utility

Jeff Murphy/ 651-266-6276 jeffrey.murphy@ci.stpaul.mn.us

13. Please add notes below to page C2 along with previous notes that were added.
    - The following work shall be performed by SPRWS on an actual cost basis. An estimate will be provided and payment in the amount of the estimate must be received before the work can be scheduled. Work of this type is currently being scheduled 4 to 6 weeks after payment and required signatures have been received:
      o Pipework within right of way for 6" DI.
      o Cut off of existing unused water services at the main.
      o Inspection of water facility work performed by owner's contractor.
14. Ratio of fire suppression to domestic takeoff must be no less than 4:1.
15. Plumbing permit applications to be made with SPRWS at 1900 Rice Street, Saint Paul, MN.
16. Before construction of a new water service can be scheduled, SPRWS must receive a Water Service Contract signed by the owner and all required payments.

17. Provide completed project data sheets to determine meter sizing.
18. Furnish one set of interior fire suppression mechanical plans for review and approval by SPRWS plumbing inspection unit.
19. Furnish one set of revised site plans for review. Following approval by SPRWS, furnish one set of approved plans.

If you have questions, please contact me at 651-266-9086 or tia.anderson@ci.stpaul.mn.us.

Tia Anderson
Senior City Planner

cc: File, Site Plan Review Committee

DEPARTMENT OF SAFETY AND INSPECTIONS
Ricardo X. Cervantes, Director

CITY OF SAINT PAUL

375 Jackson Street, Suite 220
Saint Paul, Minnesota 55101-1806

Telephone: 651-266-8989
Facsimile: 651-266-9124
Web: www.stpaul.gov/dsi

December 13, 2018

Ted Anderson
TC German Immersion School
1031 Como Ave.
St. Paul, MN 55103

Deb Rathman
Rivera Architects
775 Fairmount Ave.
St. Paul, MN 55105

Ben Ford
Rehder and Associates
3400 Federal Drive, Ste. 110
Eagan, MN 55122

RE: Application for Site Plan Review – SPR #18-117556 – Twin Cities German Immersion School Addition at 1031 Como Avenue – Notice to extend the time limit for decision under Minnesota Statute 15.99

Ted Anderson, Deb Rathman, and Ben Ford,

This letter is to inform you that the City is extending the site plan review period to February 20, 2019.

MN Statute 15.99 (1995) requires the City of Saint Paul to approve or deny zoning applications within 60 days of submission, but allows the City to "extend the time line ... by providing written notice of the extension to the applicant. The notification must state the reasons for the extension and its anticipated length, which may not exceed 60 days unless approved by the applicant."

On October 23, 2018, the property owner applied for site plan review for a building addition to the existing Twin Cities German Immersion School. Site Plan Review is a function delegated by the Saint Paul Planning Commission to City staff. However, a Site Plan may be referred to Planning Commission for public hearing if any staff decision on the site plan is likely to be appealed to the Planning Commission. The planned public hearing date with the Zoning Committee for the Site Plan is December 20, 2018 followed by a Planning Commission vote on December 28, 2018.

The City's present deadline to act on the site plan review application is December 22, 2018. Because this deadline is prior to the December 28, 2018 Planning Commission meeting, the City elects to extend the deadline for the additional 60 days allowed under Minnesota Statute 15.99. The additional 60-day period takes effect immediately upon the expiration of the initial 60-day period. Therefore, the deadline to make a final decision on your application is February 20, 2019.

For questions regarding this matter, contact me at 651-266-9086 or tia.anderson@ci.stpaul.mn.us.

Regards,

Tia Anderson
Senior City Planner

cc: File, Zoning Administrator, Planning Administrator, Ward 5 Council Office, Como Park Community Council