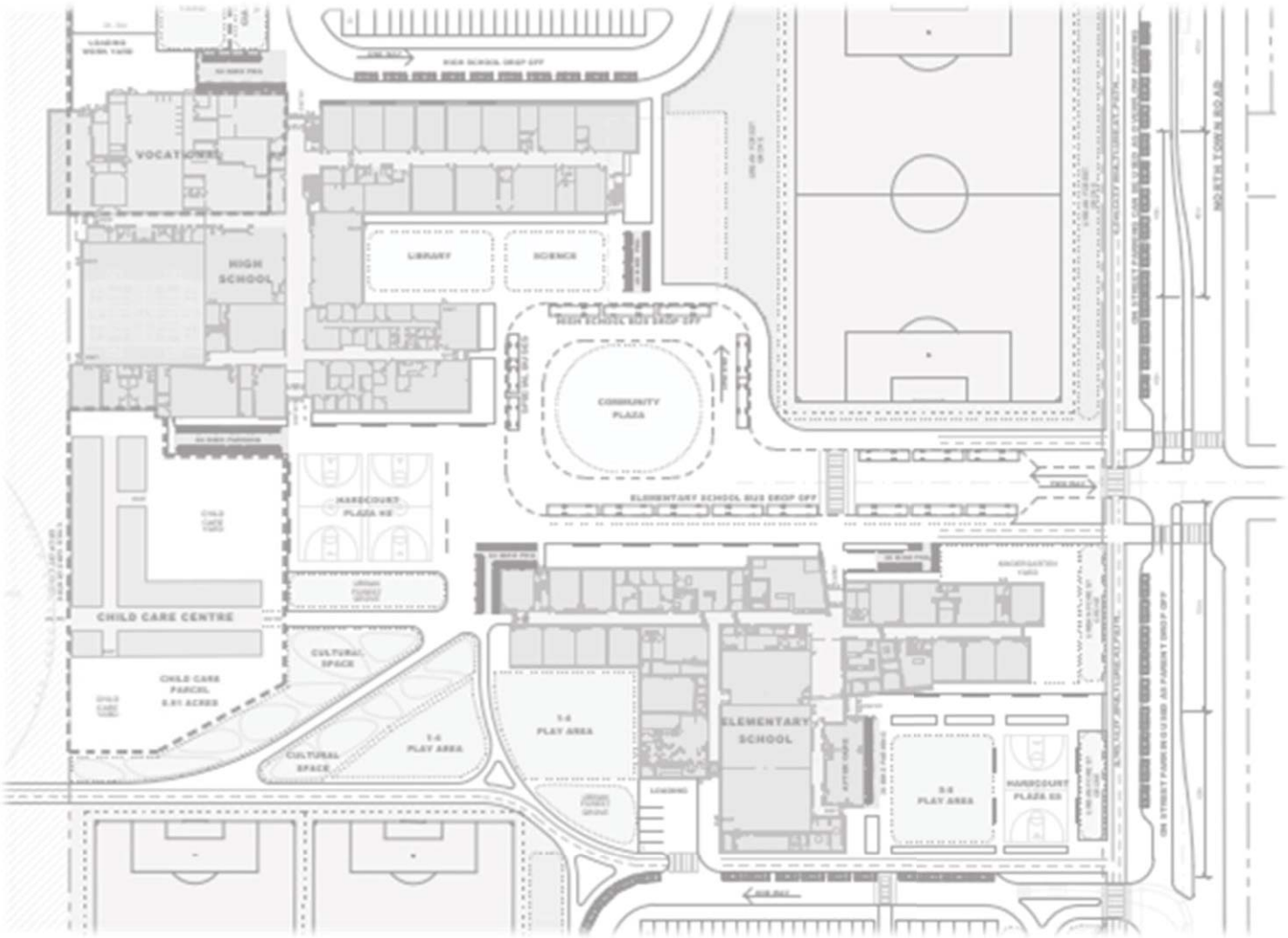

TRAFFIC AND PEDESTRIAN STUDY
WAVERLEY WEST SCHOOL SITE

Pembina Trails School Division

MMM TRANSPORTATION CONSULTING

Traffic and Pedestrian Study – Waverley West School Site

Prepared by

MORR Transportation Consulting Ltd.

Winnipeg, Manitoba

Submitted to

Pembina Trails School Division

Winnipeg, Manitoba

September 2020

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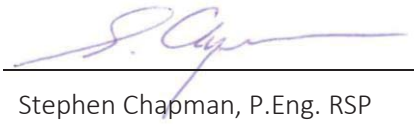

Stephen Chapman, P.Eng. RSP

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1 INTRODUCTION

1.1 Background

In March 2018, the government of Manitoba announced a plan to build a new high school and a new K-8 School in the future Waverley West "B" neighbourhood in southwest Winnipeg. The schools are to be located together, on a site east of Kenaston Boulevard, west of Waverley Street, and south of the future Bison Drive extension. The site is to also include a childcare building.

As part of the design and development approval pr ocess for the schools, the Pembina Trails School Division (PTSD) retained MORR Transportation Consulting Ltd. (MORR) to conduct a Traffic and Pedestrian Study for the proposed School Site.

Planning for the Waverley West "B" neighborhood was ongoing while the Traffic and Pedestrian Study was conducted. The School Site is proposed to be a part of the first phase of development in the Waverley West "B" neighbourhood.

1.2 Purpose and Scope

The purpose of the Traffic and Pedestrian Study was to:

- Identify means of providing safe on-site circulation and accommodation at the Waverley West School Site for all modes of travel.
- Identify means of providing for safe and efficient travel at the accesses to the Waverley West School Site, connections to the neighbourhood, and a future City of Winnipeg recreation facility immediately to the west of the School Site.

The Study included the study team providing input to the site design process, as well as analysis of implications to North Town Road and Bison Drive adjacent to the School Site. The Study considered opening day conditions, and projected conditions once the Waverley West B neighborhood is fully built out.

Conditions were assessed using the following analyses and reviews:

- The study team provided input to the Site Design throughout the study process to incorporate analysis results and to respond to inputs from other members of the school site design team and approval agencies. The input was intended to provide functional and coherent on-site circulation and access to the site, with consideration for placemaking and integration with the uses on-site, while meeting the broader site development requirements.
- A Parking and Loading Analysis considered on-site parking and loading needs. Needs were assessed relative to the City of Winnipeg's Zoning Bylaw, generalized parking demand data from the Institute of Transportation Engineers (ITE) *Parking Generation Manual*, and data from existing schools in PTSD.
- A Trip Generation Review estimated traffic volumes at each access to the site and estimated required storage lengths for turning lanes at the accesses on North Town Road.

1.3 Outline

The following sections in this report outline the study assumptions, processes, findings, and recommendations:

- The Context section details the characteristics of the proposed Waverley West School Site and the surrounding area, including forecast student population, catchment areas, and forecast development in Waverley West B.
- The Analysis and Review section describes the analysis and review processes, along with attendant assumptions and findings.
- The Summary and Recommendations section includes a list of the study findings, along with the study team's recommendations for on-site and off-site measures.

2 CONTEXT

2.1 Location

The proposed Waverley West School Site is in the proposed Waverley West B neighborhood in southwest Winnipeg. Figure 1 shows the site in relation to regional landmarks and major transportation infrastructure.

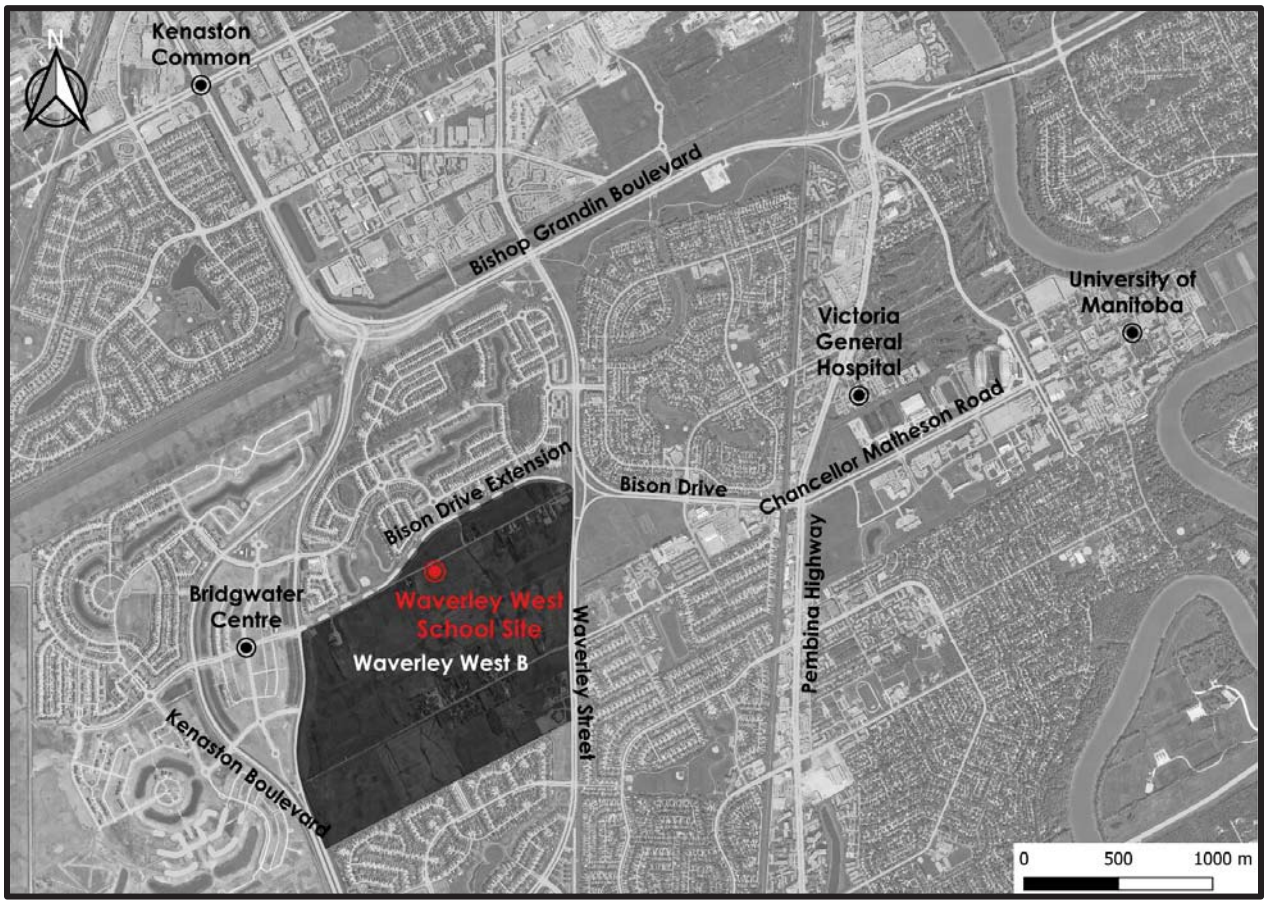

Figure 1 – Regional Context

The proposed Waverley West School Site is located approximately midway between Kenaston Boulevard Northbound to the west and Waverley Street to the east and abuts the south side of the future Bison Drive extension between Waverley Street and Kenaston Boulevard. The other fronting street for the School Site is anticipated to be an extension of North Town Road which will be located on the east side of the site. Nearby significant land uses include the University of Manitoba and Victoria General Hospital to the east, the Kenaston Common commercial area to the north, and Bridgwater Centre to the west.

Figure 2 shows a concept plan for Waverley West B, which outlines much of the local context. The School Site is shown with an "S".

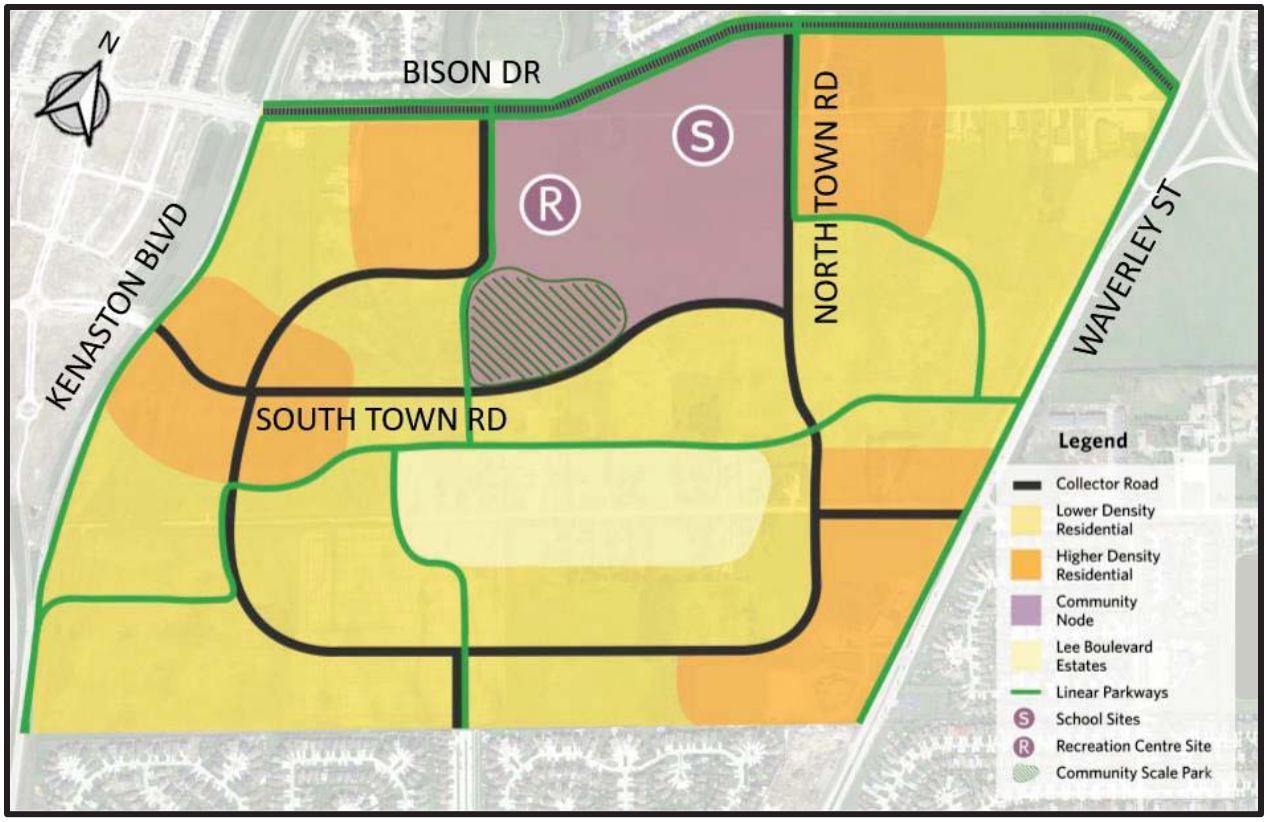

Figure 2 – Waverley West B Concept Plan

Lands to the south, east, and west of the site are currently undeveloped, but they are proposed to be developed with predominantly residential uses, as part of the Waverley West B neighborhood. The School Site is to be included in Phase 1 of Waverley West B, which is currently being planned. Stantec has completed a Preliminary Traffic Review for Phase 1. That review included estimates of trip generation on collector streets within Phase 1, with estimates for North Town Road being relevant to this study. The trip generation estimates are informing the planning and design of those collector streets, particularly the number of lanes required on each street. Trip generation estimates are discussed in Section 3.3.

Later Phases of Waverley West B are to include development of a City of Winnipeg recreation centre on a parcel immediately to the west of the School Site. Planning for the recreation centre is in the early stages and is not as advanced at the School Site. Two key School Site design requirements resulting from the adjacent recreation centre site and the funding source requirements that are integral to the School Site development are:

1. That the High School building must extend to the west property line to permit a physical connection to the future recreation centre.
2. That there must be provision for a Childcare building at the west end of the School Site with future parking and loading for the Childcare building to be located on the future City recreation centre parcel.

The above design requirements were important factors in determining the recommended site layout.

2.2 School Site Parameters

As planning for the School Site was ongoing during the study, both a base and maximum potential school capacity was considered rather than a single value. Consequently, this study considered a base scenario that reflects planned estimates of enrollment and staffing, and a maximum enrollment scenario that reflects a high-end estimate of potential enrollment that is plausible over a more limited time frame based on population pressures currently facing the school division. Table 1 shows the parameters for the proposed Waverley West School Site, under a "Base Enrollment" scenario intended to represent what has been planned for the school, and a "Maximum Enrollment" scenario intended to represent conditions with an expanded student capacity over a more limited time frame. In the table, 'faculty' refers to teachers, principals, and vice principals and 'other employees' encompasses educational assistants, support staff, lunch hour supervisors, and crossing guards.

Table 1 – School Parameters

Type	Base Enrollment Parameters	Maximum Enrollment Parameters
High School	1,200 Students 75 Faculty 70 Other Employees	1,500 Students 86 Faculty 79 Other Employees
K-8 School	800 Students 52 Faculty 42 Other Employees	1,000 Students 60 Faculty 50 Other Employees
Childcare Centre (Building Only)	176 Children 38 Staff	176 Children 38 Staff

In the base scenario, the School Site accommodates approximately 2,000 students and 239 school staff. In the maximum enrollment scenario, the student population increases by 500 students, giving a total School Site student population of 2,500 students, with 275 school staff. In both scenarios, the Childcare Centre building on the school site accommodates 176 children and 38 Childcare staff.

2.3 Study Area

The study area includes the proposed School Site, along with the adjacent sections of North Town Road and the future Bison Drive extension. Figure 3 shows the study area, with shading indicating future land uses in Waverley West B.

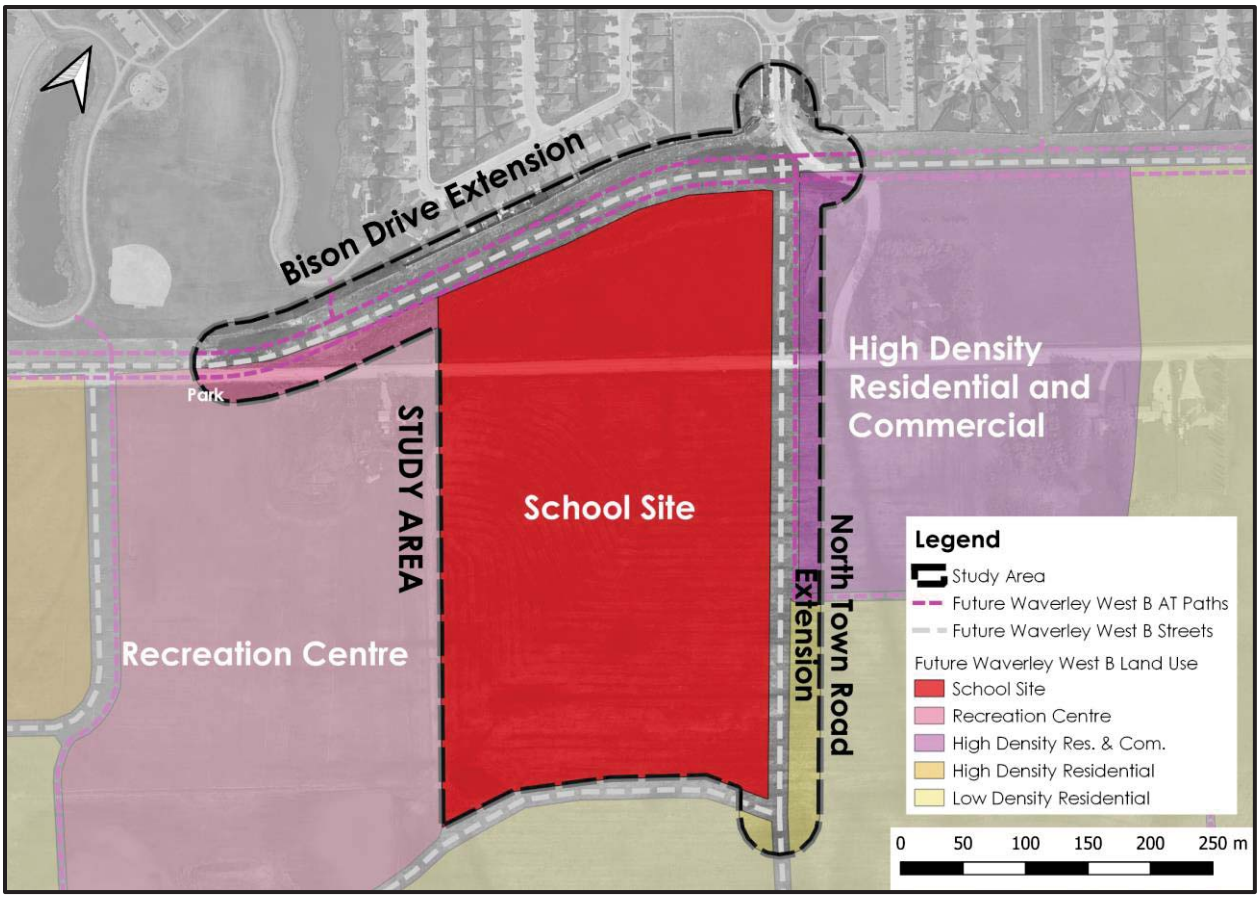

Figure 3 – Study Area

The following sections discuss the transportation and land use characteristics in the study area.

2.3.1 Streets

Table 2 outlines the projected characteristics of the Bison Drive and North Town Road extensions.

Table 2 – Street Characteristics

Street	Functional Classification	Typical Cross-Section	Anticipated Posted Speed Limit
Bison Drive (Future Extension)	Major Arterial	Urban Four-Lane Divided	60 km/h
North Town Road (Future Extension)	Collector	Urban Two-Lane Divided with Parking Bays	50 km/h

The Bison Drive extension will connect existing segments of Bison Drive west of Kenaston Boulevard and east of Waverley Street. Once the extension is in place, Bison Drive will form a continuous route from Pembina Highway—where it continues east as Chancellor Matheson Road to University Crescent—through Waverley West to its termination at Appleford Gate, near the west limit of the City of Winnipeg. Bison Drive

will thus serve a moderate mobility function as a link through southwest Winnipeg, connecting Waverley West to the University of Manitoba, and to commercial areas along Pembina Highway. In the study area, the lands adjacent to Bison Drive are to be developed for institutional use—such as the School Site, a recreation centre, and an existing park on the north side of Bison Drive—and residential uses backing or siding onto Bison Drive. The combination of institutional and residential uses on both sides of Bison Drive is expected to lead to some demand to cross Bison Drive. However, the lack of development fronting Bison Drive and the presence of relatively large setbacks and direct access restrictions will likely limit access activity on Bison Drive. Bison Drive is therefore expected to serve a moderate access function, along with the moderate mobility function.

The North Town Road extension will connect the Bridgwater Forest Neighborhood on the north side of Bison Drive to Waverley West B, on the south side of Waverley West. North Town Road is expected to serve only a local mobility function. As a collector street, North Town Road will likely include intersections spaced at least 60 m apart, and adjacent residential development will flank or back onto the street, and any sections with fronting residential development may include frontage lanes. As such, North Town Road may serve a moderate access function, particularly near the School Site, where vehicles may be parked on street for student pick-ups and drop-offs.

2.3.2 Active Transportation

Figure 4 shows existing and future active transportation (AT) paths and trails near the Waverley West School Site. Existing infrastructure is shown in green, while dashed purple lines show future AT infrastructure in Waverley West B, and in the surrounding area, per the City of Winnipeg's *Pedestrian and Cycling Strategies* document. A black circle shows the area within 2.5 km of the School Site—the approximate area accessible by a 10-minute cycling trip.

The AT network provides good coverage and connectivity in the neighborhoods to the north and west of the School Site, and the future AT network in Waverley West B will provide similar coverage and connectivity to the south. One link that is absent from current plans but would be anticipated is a path along the south side of Bison Drive from Waverley Street to Kenaston Boulevard which would provide a complete facility along the entire length of the street. The AT network should allow for some potential for travel to and from the school by active modes. The AT network to the east has significant existing gaps, which will be filled by future paths and trails included in the *Pedestrian and Cycling Strategies* document.

While the AT network provides good coverage and connectivity in some areas, the network also requires safe crossing at major streets. That will be provided via crossings integrated with signalized intersections on Kenaston Boulevard at North Town Road, Bison Drive, and South Town Road. A key part of this study will be to consider the need for controlled crossings on the future Bison Drive extension.

Figure 4 – Active Transportation and 10 Minute Cycle-Shed

2.3.3 Transit

Table 3 shows characteristics of Winnipeg Transit service in and around the study area.

Table 3 – Winnipeg Transit Service

Route	Typical Headways – Peak Periods	Typical Headways – Off-Peak Periods	Destinations Served
676 Bridgwater / River Road*	10 minutes	30 minutes	Bridgwater Centre Chancellor Station Pembina & University Crescent St. Vital Centre

* *Service began on April 12, 2020*

Winnipeg Transit service near the study area is limited to Route 676, which began service on April 12th, 2020, as part of Winnipeg Transit's rollout of Stage 2 of the Southwest Bus Rapid Transit (SWBRT) corridor. Route 676 runs on Bridgland Drive South and North Town Road, to the north of the study area, continuing west to run on Centre Street and Bridge Lake Drive. Route 676 provides service to the east, with key destinations including Pembina & University Crescent and St. Vital Centre. Route 676 is to have frequent

service during the peak periods, with 10-minute average headways. Off-peak service is to have 30-minute average headways.

Winnipeg Transit service may further develop in Waverley West B as the neighborhood develops. The study team was not aware of any details for potential new service in Waverley West B, so this study did not consider new Transit service in Waverley West B. ***Staff from PTSD indicated that until Winnipeg Transit develops routes into Waverley West, the Division would provide 9-12 school buses to serve the High School, and 8-10 school buses to serve the K-8 School.*** Those buses are intended to serve students in the catchment in areas other than Bridgwater Forest, where Winnipeg Transit Route 676 provides service close to the School Site. The PTSD school buses are also intended to serve students living at least 1.6 km from the school.

3 ANALYSIS AND REVIEW

3.1 Site Design

The study team provided input to the Site Design throughout the study as described in Section 1.2. Provision of functional and coherent on-site circulation and access to the site, with consideration for placemaking and integration with the uses on-site is discussed in this section, while parking and loading requirements are discussed separately in Section 3.2.

Figure 5 shows the recommended site plan at the time that this study was finalized in September 2020.

Important features of the site plan include:

Separation of Pedestrians, Passenger Vehicles, and Buses

The Institute of Transportation Engineers (ITE) Recommended Practice *Promoting Sustainable Transportation Through Site Design (2004)* lays out principles for site design, including:

- Minimizing vehicle-pedestrian conflicts
- Locating bus stops near major activity generators

The study team applied these principles to the site design by:

- Restricting passenger vehicle access to the edges of the site and preventing any passenger vehicle access across the site. This minimizes vehicle-pedestrian interaction within the site.
- Providing dedicated school bus loading space in the middle of the site, near the High School and the K-8 School. The bus loading space is for buses only, with no access for passenger vehicles.

Separate loading areas are provided for the High School (near the north edge of the site) and the K-8 School (near the south edge of the site). The provision of separate vehicle areas near the edges of the site will minimize vehicle-to-vehicle conflicts and allow the middle of the site to be free from vehicle traffic, except for bus traffic in the central loop. Bus traffic will be present at the central loop at the start and end of the school day but will otherwise be intermittent. The area between the High School and the K-8 School can therefore potentially serve as a community plaza-type area, including the area in the middle of the bus loop.

Where pedestrians cross vehicle paths on-site, pedestrians are intended to have priority, and the crossings are to be treated with raised pedestrian crossings.

Figure 6 shows the separate vehicle areas and the vehicle accesses on North Town Road. Figure 7 shows pedestrian circulation and crossings where raised crossings treatments are intended.

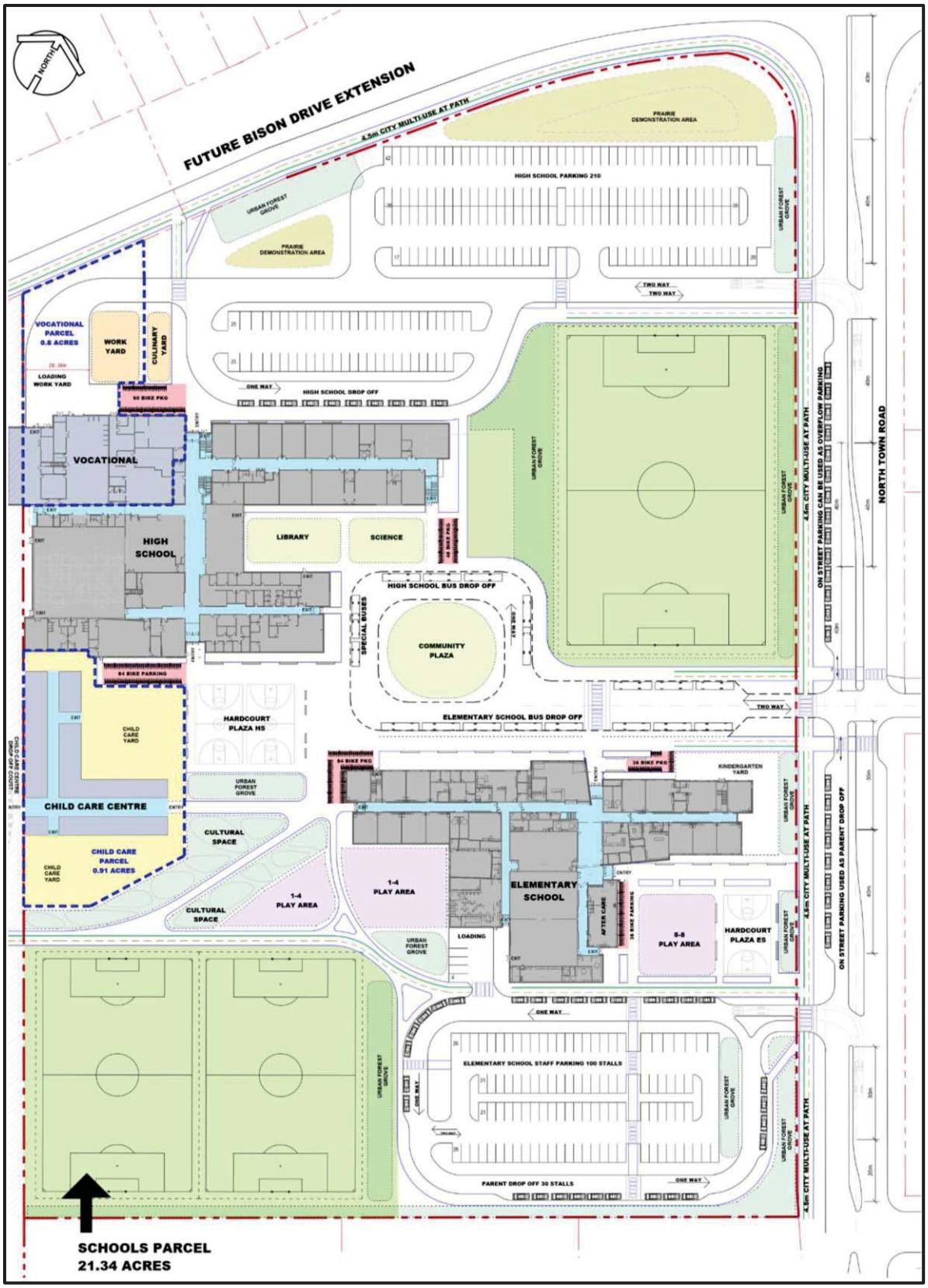

Figure 5 – Recommended Site Plan September 2020

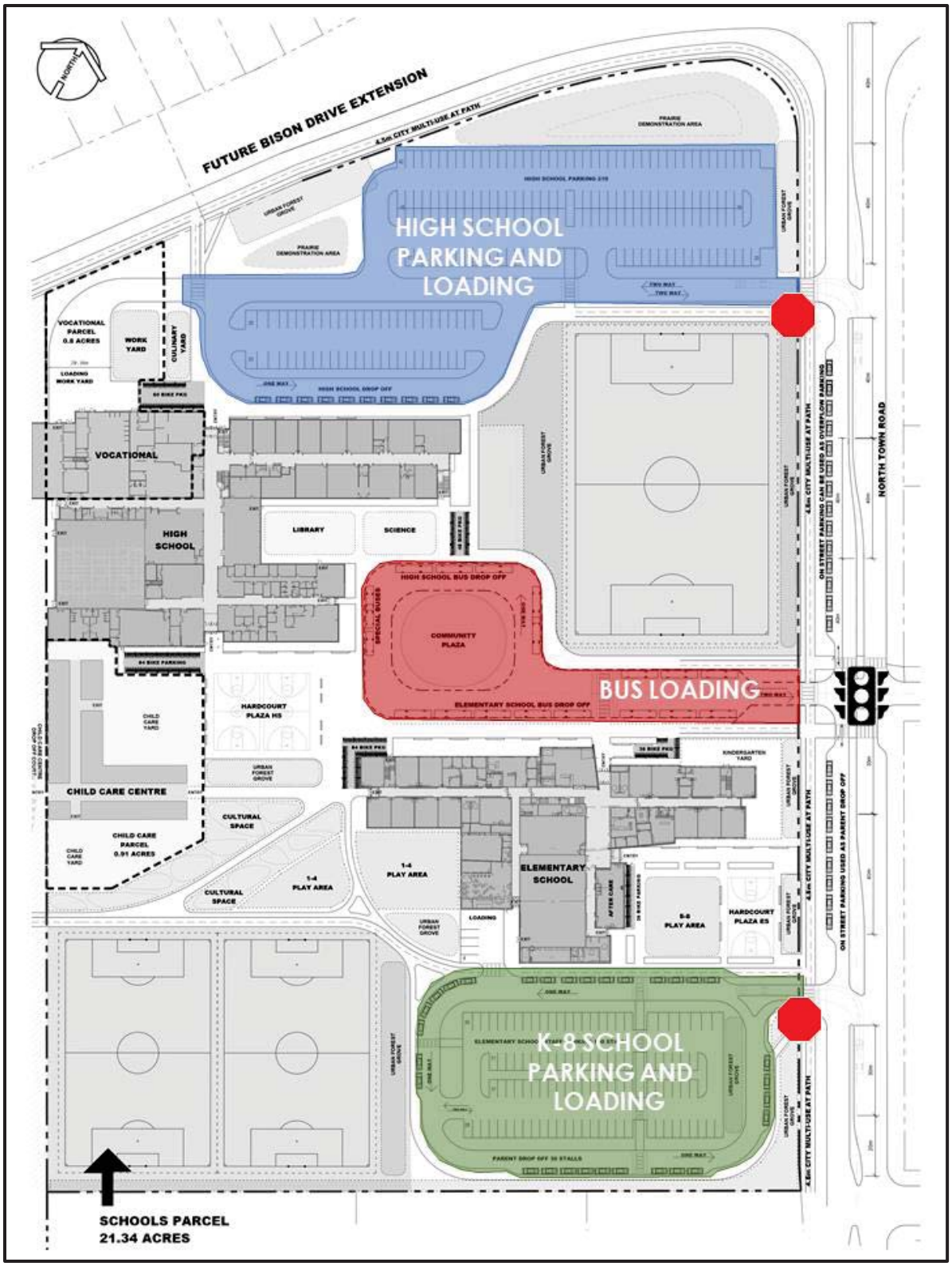

Figure 6 – Separation of Passenger Vehicles and Buses

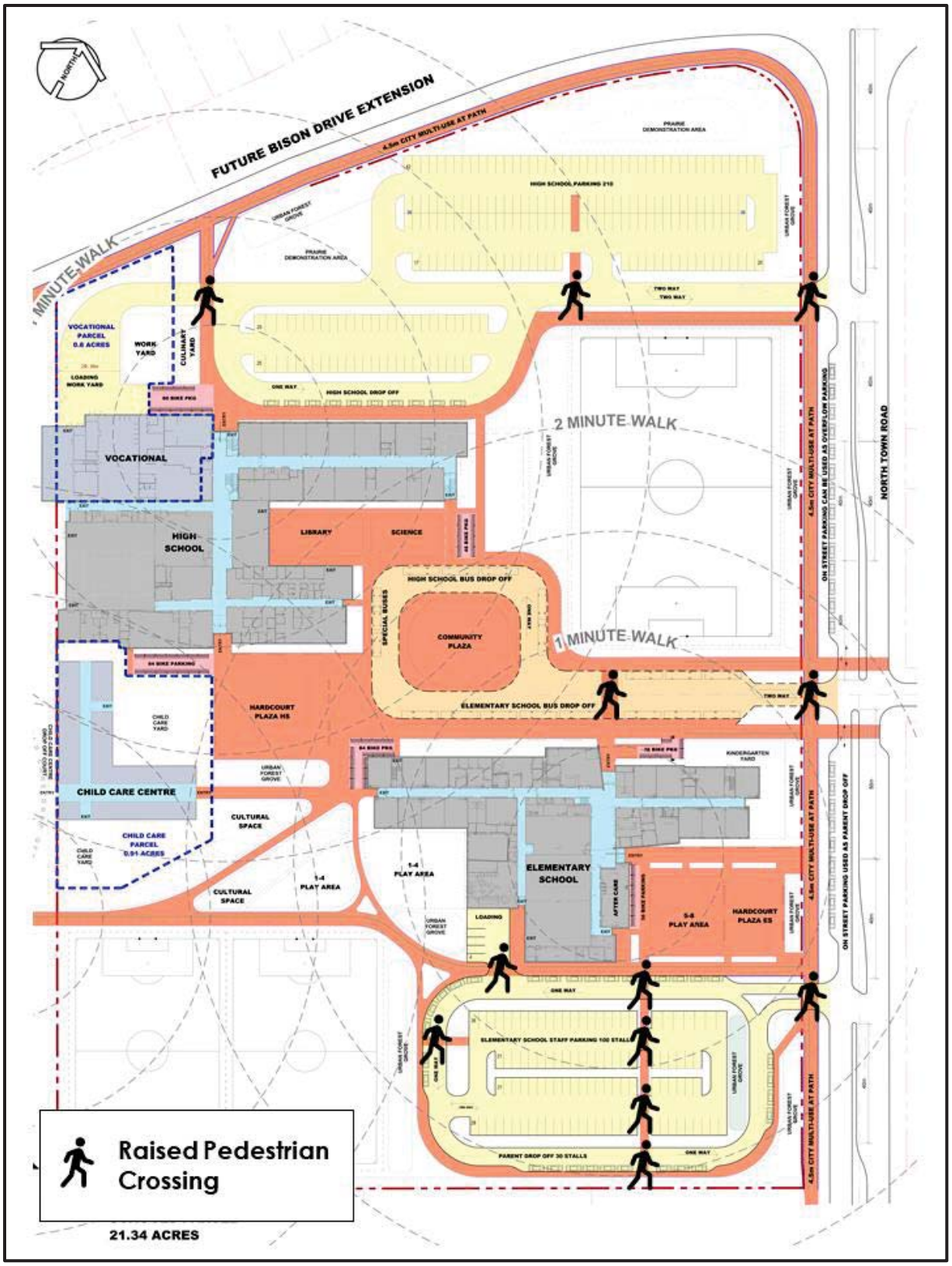

Figure 7 – Proposed Raised Pedestrian Crossings

Vehicle Accesses to North Town Road

The bus access is intended to be traffic signal controlled to prioritize bus access to and from the site, and to provide a controlled pedestrian crossing of North Town Road. The High School and K-8 School accesses are intended to operate under minor-street stop control, with North Town Road free-flowing. The High School and K-8 School accesses are intended to reduce vehicle conflicts by restricting exiting traffic to right-turns only. The Study team understands that the Waverley West B transportation network is proposed to include a roundabout on North Town Road south of the School Site, so vehicles forced to turn right and go south from the school can return to the north by making the equivalent to a U-turns at the roundabout to the south on North Town Road.

Parking bump-outs are proposed by this study on North Town Road to better define loading and parking areas, and to minimize crossing distances for pedestrians crossing North Town Road.

Low Speed, One-Way Vehicle Circulation

Passenger vehicles and buses are proposed to circulate in one-way loops for drop-offs and pick-ups. Vehicle speeds are to be controlled by limiting the length of straight sections of the vehicle circulation areas and limiting lane widths to 3 m. The circulation areas at the High School and the K-8 School allow motorists to re-circulate through the area, should they circulate through the entire area but fail to find a drop-off or pick-up spot.

The one-way operation means that motorists who drop-off or pick-up their children close to the site access still need to circulate through the entire loading area before exiting to North Town Road. This is a minor issue at the High School due to the relatively small size of the loading area, but it is a more significant issue at the K-8 School. Access to the K-8 School parking lot was limited to a single point, to prevent creating a short-cut for exiting loading vehicles through the parking lot.

Figure 8 shows the vehicle circulation areas.

Access to the Childcare Centre via the City of Winnipeg parcel immediately to the west of the site

The Childcare Centre building location at the west edge of the site means that if vehicle access was provided from North Town Road, passenger vehicles would need to circulate through the entire width of the site, creating additional vehicle-pedestrian conflicts and consuming space that would otherwise be used for productive uses.

For families with children in childcare and at the K-8 and/or High School, caregivers would need to park in one location and then walk children to the other schools. Figure 9 shows pedestrian travel time contours from the west edge of the site near the presumed future parking area for the Childcare Centre on the recreation centre site, assuming a walking speed of 1.2 m/s. Note that the High School and K-8 School are accessible within a 4 minute walk from the edge of the site.

Convenient Bike Parking

Bike parking is to be provided at convenient and visible locations near the entrances to both the High School and the K-8 School. On-site active transportation paths provide connections between bike parking areas and future active transportation facilities along North Town Road and Bison Drive.

Figure 10 shows the location of on-site bike parking areas and bike paths on-site and along the edges of the site.

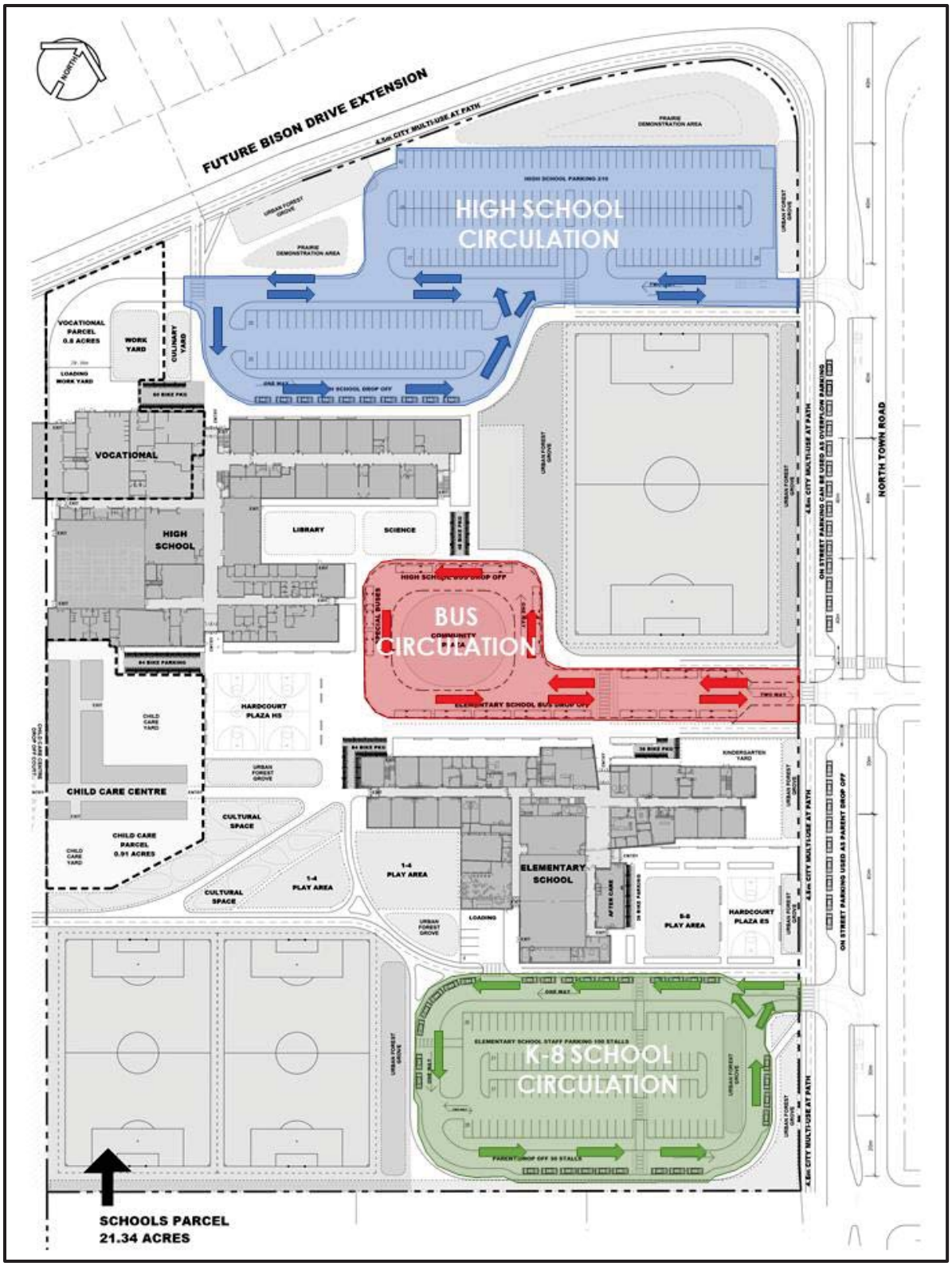

Figure 8 – Vehicle Circulation

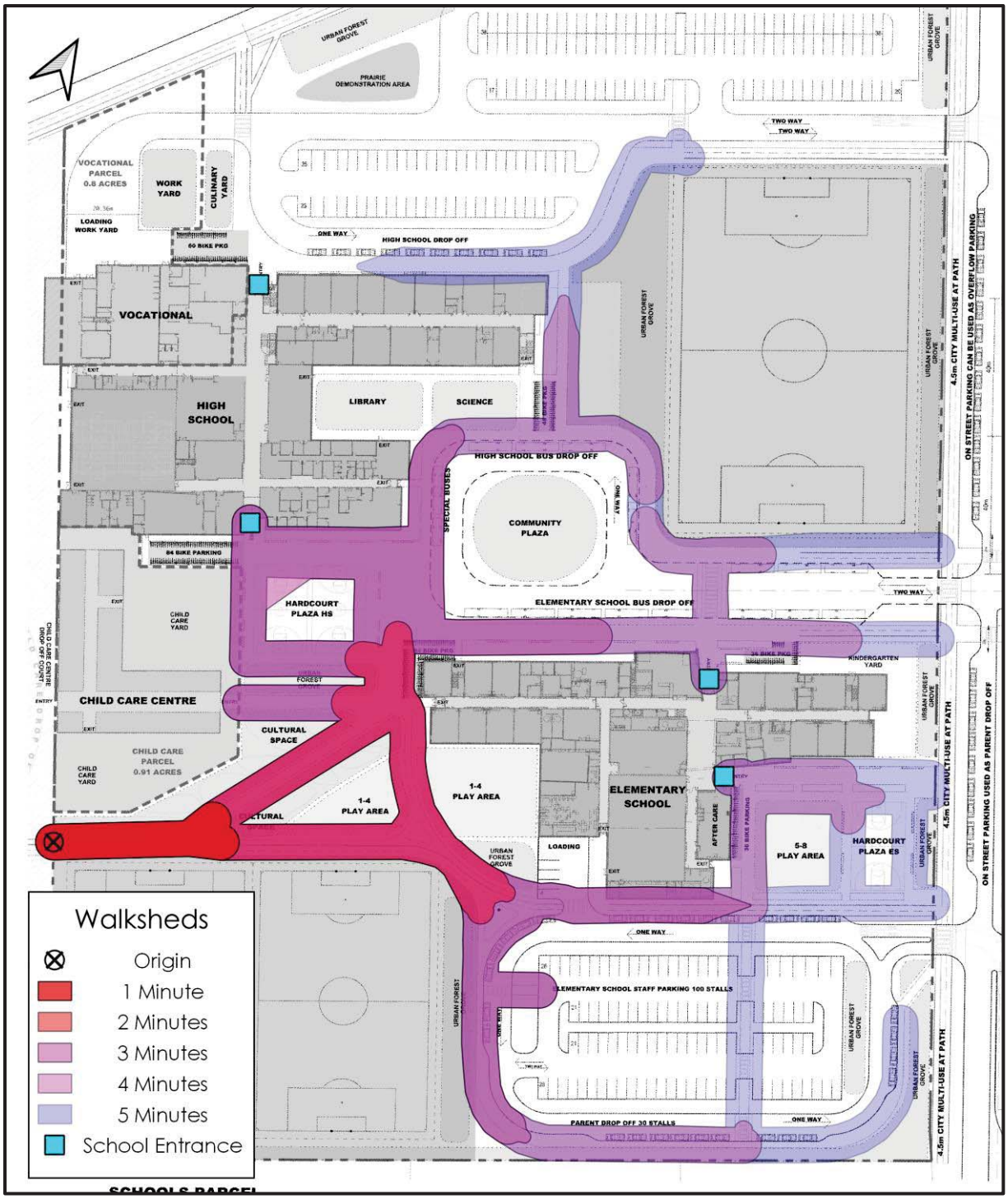

Figure 9 – Pedestrian Travel Time Contours

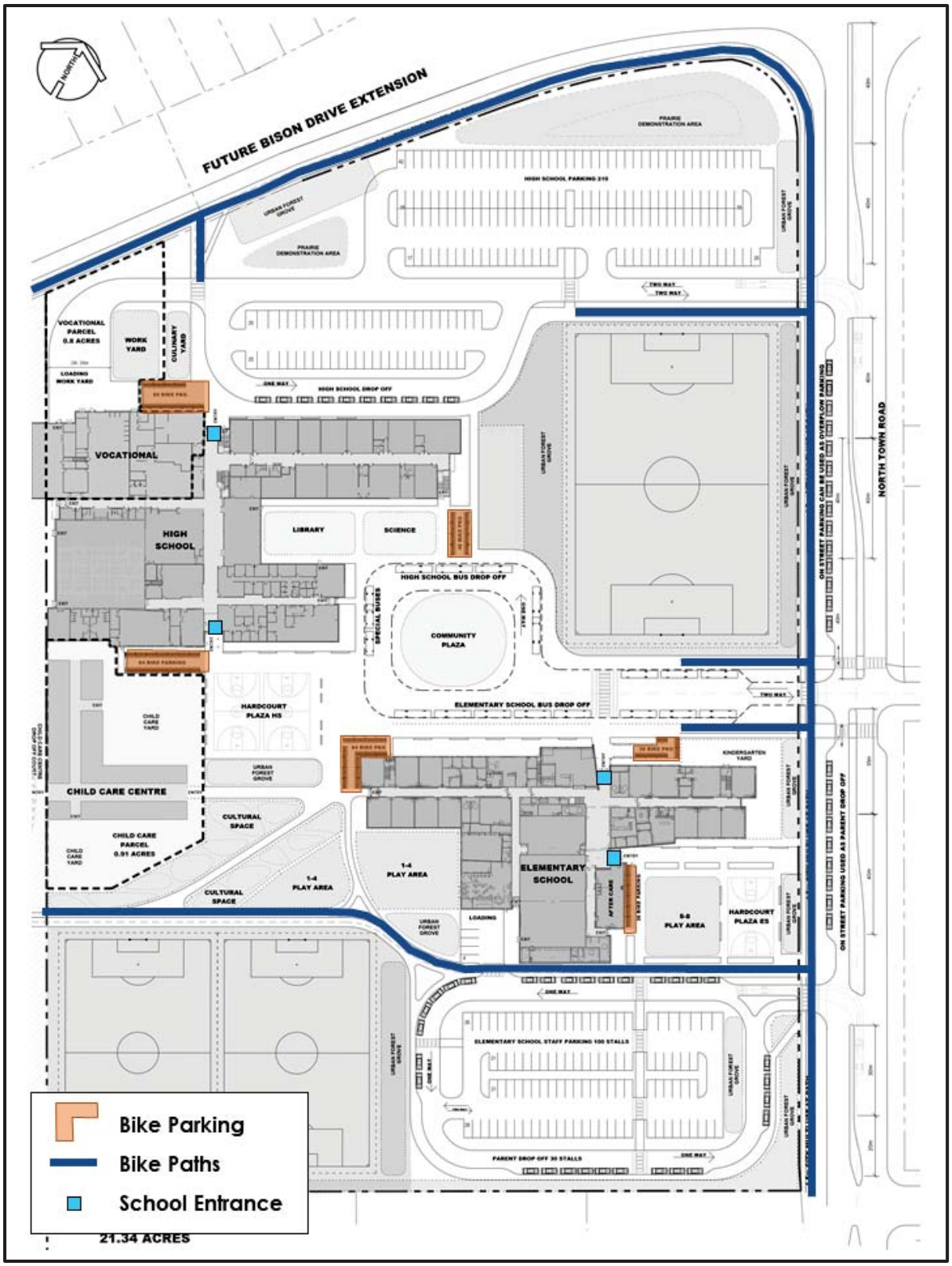

Figure 10 – Bike Parking

3.2 Parking & Loading

Parking and loading for the High School and the K-8 School is to be provided on the School Site, while parking and loading for the Childcare Centre is to be provided on the City recreation centre parcel to the west of the School Site. Parking and loading requirements were determined for each of the three uses, but the site plan only included parking and loading for the High School and the K-8 School.

Parking and loading requirements were considered from three perspectives:

- The requirements set out in City of Winnipeg Bylaw 200/2006, applied based on the school parameters outlined in Section 2.2.
- Typical parking generation rates from the Institute of Transportation Engineers *Parking Generation Manual, 4th Edition*.
- Comparisons to conditions at existing schools in Pembina Trails School Division.

Each perspective indicated how many parking and loading spaces should be provided with the By-law being interpreted as a requirement for the base scenario rather than a guideline. The perspectives did not necessarily agree—Section 3.2.4 describes how the study team arrived at the parking supply shown on site plan, with consideration for each of the three perspectives.

3.2.1 City of Winnipeg Zoning Bylaw 200/2006

City of Winnipeg Zoning Bylaw 200/2006 sets out parking and loading requirements for various types of land uses. Table 4 summarizes the parking supply requirements for High Schools, K-8 Schools, and Childcare Centres as stated in Table 5-9 in Bylaw 200/2006. Note that the Bylaw doesn't include a category for K-8 Schools, so the junior High School requirements were used in their place.

Table 4 – City of Winnipeg Bylaw 200/2006 Parking Requirements

Use	Parking Supply Required
High School	1 space per 2 faculty, plus 1 space per 4 employees, plus 1 space per 10 students 1 bike space per every 10 vehicle spaces
K-8 (Junior High) School	1 space per 2 faculty, plus 1 space per 4 employees 1 bike space per every 10 vehicle spaces
Childcare (Daycare) Centre	1 guest space per 10 children, plus 1 space per 3 employees at maximum shift 1 bike space per every 10 vehicle spaces

Table 5 shows the resulting parking supply requirements for each facility, under the "Base Enrollment" and "Maximum Enrollment" scenarios introduced in Section 2.2.

Table 5 – Bylaw Parking Requirements Applied

Use	Base Parking Required	Maximum Parking Required
High School	175 spaces 18 bike spaces	213 spaces 22 bike spaces
K-8 School	37 spaces 4 bike spaces	43 spaces 5 bike spaces
Childcare Centre	30 spaces 3 bike spaces	30 spaces 3 bike spaces

In the base scenario, the bylaw would require 175 parking spaces at the High School, 37 spaces at the K-8 School, and 30 spaces at the day care.

In the maximum enrollment scenario, the additional students and staff at the High School increase the required parking there by 38 spaces to a total of 213 spaces. The K-8 School would require an additional 6 spaces, for a total of 43 spaces.

Bylaw 200/2006 also sets out the following loading requirements:

- High schools should provide queueing and loading spaces for three school buses and three passenger vehicles.
- Junior High Schools should provide queueing and loading spaces for three school buses and five passenger vehicles.
- Queueing and loading requirements for Childcare Centres are qualitative—enough queueing and loading space should be provided to avoid causing issues on adjacent streets.

Note that the loading requirements do not consider the size of the school—a High School with 1,000 students would require the same loading provisions as a High School with 500 students. The study team's experience at other schools in Winnipeg suggests that the bylaw requirements are significantly lower than the demand for queueing and loading spaces at most schools.

3.2.2 Institute of Transportation Engineers *Parking Generation* Estimates

The Institute of Transportation Engineers (ITE) *Parking Generation Manual* provides information on the parking demand typically generated by various land uses. Data is based on surveys from multiple similar land uses in Canada and the United States, such that various statistics can be derived, including average, minimum and maximum, and various percentile demand during the peak period.

Table 6 shows the relevant parking generation data from the 4th Edition of the *Manual*, as applied to the High School, K-8 School, and Childcare Centre. Note that parking generation for the schools is based on the student population, with no explicit consideration of staffing. Parking generation for the Childcare Centre can be considered based on the number of children or based on staffing.

Table 6 – ITE Parking Generation

Use	ITE Land Use	Parking Generation Rate	Peak Period Demand	Estimated Parking Demand (Base)	Estimated Parking Demand (Max)
High School	530 – High School (suburban)	0.23 spaces per student	10:00 AM – 11:00 AM	276 spaces	345 spaces
K-8 School	522 - Junior High School	0.09 spaces per student	11:00 AM – 12:00 PM	72 spaces	90 spaces
Childcare Centre	565 – Daycare Centre	0.24 spaces per child	4:00 PM – 6:00 PM	42 spaces	42 spaces
		1.38 spaces per staff	9:00 AM – 10:00 AM and 4:00 PM – 6:00 PM	52 spaces	52 spaces

When considering the results from Table 6 it is important to note the following for context:

- The High School data is all based on eight suburban locations in the United States studied prior to 2009. The average number of students at the High Schools was similar to the Waverley West site at 1,170 students.
- The K-8 School data is based on Junior High values meaning that the schools studied did not include elementary school grades. There are only three schools in the data set and all three are in the United States and were studied prior to 2010.
- The Childcare Centre data set has many more sites, with 39 locations in the data set. However, all locations are in the United States and were studied prior to 2004.

According to the parking generation rates from the *Manual*, in the base scenario the High School would require 276 parking spaces during its peak period, from 10:00 AM to 11:00 AM In the maximum enrollment scenario, the peak demand would increase to 345 spaces.

In the base scenario the K-8 School would require 72 spaces during its peak period, from 11:00 AM to 12:00 PM In the maximum enrollment scenario K-8 School demand would be 90 spaces.

For the Childcare Centre, if parking generation was considered based on the number of children, 42 spaces would be required, with peak demand occurring from 4:00 PM to 6:00 PM Considering demand based on the staffing figure, peak demand would be 52 spaces, with the peak occurring from 9:00 AM to 10:00 AM and from 4:00 PM to 6:00 PM.

3.2.3 Comparison to Existing Schools in Pembina Trails School Division

Staff from PTSD provided data on student population, staffing, parking supply, and transportation issues at several existing schools in the division. The existing schools included four High Schools:

- Fort Richmond Collegiate, with 1,335 students in Grades 10 to 12
- Vincent Massey Collegiate, with 1,215 students in Grades 9 to 12
- Shaftesbury High School, with 755 students in Grades 9 to 12
- Oak Park High School, with 875 students in Grades 9 to 12

Table 7 shows key parking and loading data from the High Schools. Columns show the average from all schools surveyed, and the averages from schools where PTSD noted good and poor performance. Loading space included off-street loops, signed on-street loading areas, and signed no-parking areas along the school frontage.

Table 7 – High School Data

Factor	Average (All Schools)	Average (Schools with Good Performance)	Average (Schools with Poor Performance)
Parking			
Staff Parking Spaces per Staff Member	0.94	0.96	0.90
Student Parking Spaces per Student	0.02	0.02	0.02
Visitor Parking Spaces per Student	0.002	0.001	0.003
Bike Parking Spaces per Student	0.05	0.05	0.07
Loading			
Loading Positions (Assuming 7 m per vehicle)	17	13*	28**
Loading Positions per Student	0.016	0.014*	0.021**

* Good performance for bus loading only. Student loading performance was still poor.

** Poor performance for both bus and student loading.

Data from the High Schools showed the following:

- On average, the High Schools had 0.94 parking spaces per staff member. Three of the schools noted that the staff parking supply was sufficient, and the average provision from those schools was 0.96 spaces per staff member. At the one school where staff parking was insufficient, the provision was 0.90 spaces per staff member.
- Each of the High Schools provided student parking at a ratio of approximately 0.02 parking spaces per student. At two of the schools, that supply ratio was found to be sufficient, while the supply ratio was found to be insufficient at the other two High Schools.
- Visitor parking supplies were very low, ranging from none to six spaces. At one of the schools the supply was sufficient, while at the other three the supply was insufficient.

- On average, the High Schools had 0.05 bike parking spaces per student. That supply was found to be sufficient at three of the four schools, but one school found the supply to be insufficient.
- The High Schools provided an average of 0.016 loading positions per student. Two of the schools provided some form of off-street loading area, while the other two schools relied entirely on adjacent streets for loading. All the schools had issues with student pick-ups and drop-offs. Three of the schools had acceptable bus loading, but those schools had less loading area than the one school with bus loading issues. This suggests that the loading positions per student is not a precise guide to whether loading issues will occur.
- All four of the schools noted issues on adjacent City Streets.

The existing schools also included eight schools serving some range of Grades from as low as Kindergarten to as high as Grade 9. These "K-9" schools included:

- South Pointe School, with 950 students in Kindergarten to Grade 8
- Henry G. Izatt Middle School, with 630 students in Grades 5 to 9
- Whyte Ridge School, with 562 students in Kindergarten to Grade 4
- Acadia Junior High School, with 675 students in Grades 7 to 9
- Dalhousie School, with 540 students in Kindergarten to Grade 6
- Arthur A. Leach School, with 550 students in Grades 5 to 9
- Bonnycastle School, with 510 students in Kindergarten to Grade 4
- Bairdmore School, with 415 students in Kindergarten to Grade 6

Table 8 shows key parking and loading data from the K-9 schools. Loading space included off-street loops, signed on-street loading areas, and signed no-parking areas along the school frontage. Columns show the average from all schools surveyed, and the averages from schools that noted good and poor performance. Note that four of the schools provided separate space for bus loading. Results are shown separately for those schools and for the other four schools.

Table 8 – K-9 School Data

Factor	Average (All Schools)	Average (Schools with Good Performance)	Average (Schools with Poor Performance)
Parking			
Staff Parking Spaces per Staff Member	0.85	1.03	0.56
Visitor Parking Spaces per Student	0.007	0.006	0.008
Bike Parking Spaces per Student	0.22	0.22	0.16
Loading – Schools with Separate Bus Loading			
Bus Loading Positions (Assuming 15 m per bus)	5	5	5
Bus Loading Positions per Student	0.008	0.007	0.009
Student Loading Positions (Assuming 7 m per vehicle)	20	n/a	20
Student Loading Positions per Student	0.016	n/a	0.016
Loading – Schools with Shared Loading			
Student Loading Positions (Assuming 7 m per vehicle) *	17	19	16
Loading Positions per Student	0.028	0.028	0.029

* Assumes all loading space is for student pick-up, with no buses.

Data from the K-9 schools showed the following:

- On average, schools provided 0.85 staff parking spaces per staff member. Five of the schools were noted to have acceptable staff parking, and those schools provided an average of 1.03 staff parking spaces per staff member. The three schools with insufficient staff parking provided an average of 0.56 staff parking spaces per staff member.
- Visitor parking supplies were low, ranging from 0 to 14 spaces, for an average of 0.007 visitor parking spaces per student. Except for one school—Acadia Junior High School—all schools noted that visitor parking was insufficient. There was essentially no difference in visitor parking supply between Acadia and the other schools.
- The schools provided an average of 0.22 bike parking spaces per student. Bike parking supply was noted to be sufficient at seven of the eight schools. The one school with insufficient bike parking provided 0.16 bike parking spaces per student.
- Of the schools with dedicated bus loading areas, the average provision 0.008 bus loading positions per student. Counterintuitively, the schools that noted acceptable bus loading provided fewer bus loading positions per student than the schools with bus loading issues. This may be due to the share of students require busing at the schools, traffic operations where the buses enter and exit the loading areas, or the design of the bus loading areas. The relationship between bus

loading positions and school population does not appear to be a precise guide to whether bus loading issues will arise.

- The schools with separate bus loading areas provided an average of 0.016 student loading positions per student This provision was found to be insufficient at all the schools.
- Schools with combined loading areas—with no distinction between bus loading and student loading—provided an average of 0.028 student loading positions per student. Note that this assumes that the entire loading length can be used for student loading, with no buses present. One of the schools—Acadia Junior High School—noted that both student and bus loading was acceptable. At Acadia, the provision of loading space was consistent with the average from the other schools. This suggests that the loading length per student is not a precise guide to whether loading issues will arise.
- All eight schools noted that there were issues on adjacent City streets.

Table 9 shows the resulting parking provisions if the Waverley West High School and K-8 Schools were to have parking and loading provisions consistent with the comparable schools that provide good performance.

Table 9 – Parking Supply based on Comparable Schools with Good Performance

Use	Parking Supply Provided at Comparable Schools with Good Performance	Resulting Parking Supply for Waverley West (Base)	Resulting Parking Supply for Waverley West (Max)
High School	0.96 staff parking spaces per staff member 0.02 student parking spaces per student 0.001 visitor parking spaces per student 0.05 bike parking spaces per student	140 spaces 24 spaces 2 spaces 60 bike spaces	159 spaces 30 spaces 2 spaces 75 bike spaces
	High School Total	166 spaces 60 bike spaces	191 spaces 75 bike spaces
K-8 School	1.03 staff parking spaces per staff member 0.006 visitor parking spaces per student 0.22 bike parking spaces per student	97 spaces 5 spaces 176 bike spaces	114 spaces 6 spaces 220 bike spaces
	K-8 School Total	102 spaces 176 bike spaces	120 spaces 220 bike spaces

Based on parking data from comparable schools, the High School would require 166 parking spaces in the base enrollment scenario, and 191 spaces in the maximum enrollment scenario. Bike parking requirements would be 60 spaces for the base enrollment scenario and 75 spaces for the maximum enrollment scenario.

If the K-8 School were provided with parking consistent with the well-performing comparable schools, it would require 102 spaces for the base enrollment scenario and 120 spaces for the maximum enrollment

scenario. Bike parking requirements would be 176 spaces for the base enrollment scenario and 220 spaces for the maximum enrollment scenario.

Table 10 shows the loading requirements for the Waverley West School Site if loading was to be provided at a level consistent with the well-performing comparable schools. Loading for the K-8 School was considered in terms of separate bus and passenger vehicle loading, and combined bus and passenger vehicle loading.

Table 10 – Loading Supply based on Comparable Schools with Good Performance

Use	Loading Supply Provided at Comparable Schools with Good Performance	Resulting Loading Supply for Waverley West (Base)	Resulting Loading Supply for Waverley West (Max)
High School	0.021 loading positions per student*	25 positions	32 positions
K-8 School (separate loading)	0.007 bus loading positions per student 0.016 passenger vehicle loading positions per student	6 bus positions 13 positions	7 bus positions 16 positions
K-8 School (combined loading)	0.028 total loading positions per student	23 positions	28 positions

* loading provision taken from schools with poor performance—that provision was greater than at the schools with good performance.

Based on data from the comparable schools, the High School requires 25 loading positions for the base enrollment scenario and 32 loading positions for the maximum enrollment scenario.

Considering loading in terms of separate bus loading and passenger vehicle loading, the K-8 School should have 6 bus positions and 13 passenger vehicle positions for the base enrollment scenario, and 7 bus positions and 16 passenger vehicle positions for the maximum enrollment scenario. If K-8 School parking is considered as a total without a distinction between bus and passenger vehicle loading, the provision should be 23 positions for the base enrollment scenario, and 28 positions for the maximum enrollment scenario.

Appendix A shows the comparable school data provided by Pembina Trails School Division.

3.2.4 Summary

The site plan shown on Figure 5 includes parking and loading supplies based on a synthesis of the Bylaw requirements, ITE parking generation, and comparable schools in Pembina Trails School Division. The following sections describe how the site plan parking and loading supply figures reflected in the site plan were developed, and how the supplies compare to forecast requirements from the Bylaw, ITE, and the comparable schools.

Parking Summary

Table 11 shows the parking supplies for the Waverley West School Site compared to the requirements based on the Bylaw, ITE parking generation, and data from comparable schools in Pembina Trails School Division. Note that the parking supplies shown below represent the total parking supply, including parking for staff, students, and visitors.

Table 11 – Parking Space Summary

	Enrollment Scenario	Bylaw 200/2006	ITE	Comparable Schools	Site Plan Parking Supply
High School	Base	175 spaces 18 bike spaces	276 spaces	166 spaces 60 bike spaces	215 spaces* 192 bike spaces
	Maximum	213 spaces 22 bike spaces	345 spaces	191 spaces 75 bike spaces	
K-8 School	Base	37 spaces 4 bike spaces	72 spaces	102 spaces 176 bike spaces	100 spaces 156 bike spaces
	Maximum	43 spaces 4 bike spaces	90 spaces	120 spaces 220 bike spaces	
Childcare Centre	Base	30 spaces 3 bike spaces	52 spaces	N/A	N/A
	Maximum	30 spaces 3 bike spaces	52 spaces	N/A	

* Five spaces supplied for the vocational area of the high school are not shown directly on the site plan

For the high school, the parking supply based on the comparable schools was slightly lower than the Bylaw, but significantly lower than the demand forecast from the ITE data. This suggests that a prudent supply would be similar to the Bylaw requirement—slightly more than the amount based on the comparable schools, but lower than the possibly-excessive ITE forecast. Recall from Section 3.2.2 that the ITE data is not necessarily current or locally-adjusted. The ITE data is largely taken from schools in the USA, from prior to 2010. The study team thus considered the data from the comparable schools as a more reliable guide to likely parking demand. The site plan provides 215 spaces—more than enough for the base enrollment scenario, and effectively equal to the Bylaw requirement for the maximum enrollment scenario. The site plan also includes 192 bike parking spaces—well above the Bylaw and comparable school requirements for the base and maximum enrollment scenarios.

For the K-8 School, the three data sources provided a considerable range of parking supply requirements. In the base enrollment scenario, the Bylaw requirements called for at least 37 spaces, ITE forecast demand

at 72 spaces, and the comparable schools showed that the K-8 School would require 102 parking spaces. In this case, it would likely be prudent to provide parking consistent with the data from the comparable schools, as it provides an up-to-date picture of actual conditions at similar schools. The site plan includes 100 spaces—approximately equal to the requirement for the base scenario based on the comparable schools and to the total numbers of faculty and other staff, but below the comparable school requirement for the maximum enrollment scenario. As such, if K-8 enrollment approaches the level included in the maximum enrollment scenario for a period of time, there may be a small amount of unmet parking demand at the K-8 School. The site plan bike parking supply (156 spaces) is less than the supply required based on the comparable schools for the base and maximum enrollment scenarios, but any shortage there is more than accounted for on site in the surplus of bike parking spaces at the High School.

Data on the Childcare Centre was limited to the Bylaw requirements and the ITE data. The ITE data showed that the proposed Childcare Centre would require an additional 12 to 22 spaces over the Bylaw requirement. When compared to the Childcare staffing—38 staff—the ITE requirement would provide one space for each staff member, plus additional spaces which could be used for pick-up or drop-off. In this case, it may be prudent to provide one space per staff member, plus a handful of spaces for visitors or other users. As noted in Section 3.2, parking and loading for the Childcare Centre is to be provided at the City recreational facility immediately to the west of the School Site. As such, the site plan does not include parking for the Childcare Centre.

Loading Summary

Table 12 shows the site plan loading provision compared to the requirements based on the Bylaw, ITE parking generation rates, and data from comparable schools in Pembina Trails School Division. ITE parking generation did not address loading for schools or Childcare Centres, so the data was limited to the Bylaw and the comparable schools.

Table 12 – Loading Position Summary

Type	Enrollment Scenario	Bylaw 200/2006	ITE	Comparable Schools	Site Plan Loading Provision
High School	Base	3 Buses + 3 Passenger Vehicles	N/A	25 Passenger Vehicles	8 Buses + 20 Passenger Vehicles*
	Maximum	3 Buses + 3 Passenger Vehicles	N/A	32 Passenger Vehicles	
K-8 School	Base	3 Buses + 5 Passenger Vehicles	N/A	7 Buses + 23 Passenger Vehicles	8 Buses + 30 Passenger Vehicles
	Maximum	3 Buses + 5 Passenger Vehicles	N/A	9 Buses + 28 Passenger Vehicles	
Childcare Centre	Base	Avoid issues on adjacent streets	N/A	n/a	N/A
	Maximum	Avoid issues on adjacent streets	N/A	n/a	

* Not all high school passenger vehicle spaces are indicated on the site plan but there is room for 20 vehicles in the loading bay.

For the high school, the Bylaw calls for a handful of bus and vehicle loading positions, with no consideration for the student population. The comparable schools didn't show a clear trend on the level of loading provision that would lead to good performance. The average provision was 0.016 loading positions per student, and the most generous provision was 0.021 loading positions per student. For the Waverley West School Site, it may be prudent to provide 0.025 loading positions per student. That loading provision is slightly above comparable schools in light of the very suburban nature of the site and an anticipated large catchment area (particularly in the first few years that the schools are open), while likely not creating an excessive amount of loading space. At 0.025 loading positions per student, the high school would require 30 positions in the base enrollment scenario, and 38 positions in the maximum enrollment scenario. The site plan includes 20 loading positions on-site, with space for an additional 13 loading positions on-street on southbound North Town Road adjacent to the School Site. The combined on-site and on-street loading provision is more than sufficient for the base enrollment scenario, and slightly below the forecast requirement for the maximum enrollment scenario.

Recall from Section 2.3.3 that Pembina Trails School Division (PTSD) plans to provide 9-12 buses to serve the high school in the near term. In the longer term—assuming Winnipeg Transit service expands into Waverley West B—PTSD bus service will likely decrease. The site plan on Figure 5 includes eight bus loading positions allocated to the High School—likely sufficient for normal operations, as all 9-12 buses are unlikely to arrive at the High School at the same time. The eight bus supply is consistent with the forecasts based on data from the comparable schools, which indicated that seven bus positions should be provided for the base enrollment scenario, and nine positions should be provided for the maximum enrollment scenario.

For the K-8 School, the Bylaw again calls for minimal loading provisions, with no consideration for student population. The comparable schools showed that acceptable bus loading could be achieved by providing 0.006 bus loading positions per student, but that didn't hold at all schools—some schools with 0.008 bus loading positions per student still had unacceptable bus loading performance. This indicates that the relationship of bus loading positions to student population is not the sole determinant of bus loading performance. It may be prudent to provide 0.009 bus loading positions per student—a slightly more generous provision than the average from the comparable schools with unacceptable bus loading. This equates to seven bus loading positions for the base enrollment scenario, and nine bus loading positions in the maximum enrollment scenario. As noted in Section 2.3.3, PTSD plans to provide 8-10 buses to serve the K-8 School. The site plan on Figure 5 includes eight bus loading positions—consistent with the demand estimated from the comparable schools, and with the total number of buses to be provided by PTSD.

For passenger vehicle loading at the K-8 School, there were no comparable school examples of loading supplies that yielded good performance. There were some schools that provided good performance with shared bus and passenger vehicle loading—those schools provided 0.028 loading positions per student. However, schools with poor performance provided slightly more loading, at 0.029 positions per student. That loading ratio would provide 23 spaces under the base enrollment scenario and 28 spaces under the maximum enrollment scenario. The study team opted to provide more loading positions, in the hope that a greater supply would prevent loading issues at the School Site. The site plan includes a loading supply of 30 passenger vehicles—approximately 30% more than the provision based on the ratios for the base enrollment scenario, and approximately 10% more than the provision based on the ratios for the maximum enrollment scenario.

Data on loading requirements for the Childcare Centre was limited to the Bylaw, which only provided general, qualitative guidance. Considering that Childcare pick-ups and drop-offs will require parents or caregivers to briefly park and enter the facility, any "loading" facilities at the Waverley West School Site will essentially be short-term, high-turnover parking areas. Considering the number of child spaces (176) at the Waverley West School Site Childcare Centre, it may be prudent to provide one short-term pick-up drop-off spot for every four childcare spaces. That would equate to 44 spaces in both the base and maximum enrollment scenarios. Parking and loading for the Childcare Centre is to be provided at the City recreation centre to the west of the School Site. That parking and loading was therefore not shown on the site plan on Figure 5.

3.3 Trip Generation

The study team conducted a trip generation review to forecast traffic volumes at each of the site accesses on North Town Road. Those traffic forecasts were used to estimate storage requirements for northbound left-turn lanes on North Town Road at the High School, the K-8 School, and the central bus loop.

Traffic forecasts were completed for weekday AM peak hour and weekday PM peak hour conditions. Forecasts were scenario with maximum enrollment scenario (see Section 2.2) and a fully developed street network in Waverley West B, including the extension of Bison Drive from northbound Kenaston Boulevard to Waverley Street. The "opening day" Waverley West B street network may result in more vehicles coming from the south on North Town Road, and thus increasing the northbound left-turn volumes at the School

Site. However, there will likely be less southbound traffic on North Town Road in that scenario, allowing for shorter northbound left-turn queues, and less northbound traffic on North Town Road to be affected if left turn queues spill out of their storage lanes. As such, the study team considered the fully developed street network as a suitable case for analysis.

The trip generation review methodology was:

- Select trip generation rates from the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10th Edition*. The *Manual* is a standard reference for trip generation studies, and it includes trip generation rates for various land use types and time periods. For schools and childcare centres, the *Manual* includes separate trip generation rates for High Schools, K-8 Schools, and Daycare centres. The *Manual* also includes data on inbound vs outbound splits of generated trips. The *Manual* does not distinguish between bus trips and passenger vehicle trips; or between parent drop-off trips, student driving trips, and staff trips.
- Use the trip generation rates to forecast trip generation from the Waverley West School Site. The resulting trip generation was in terms of inbound and outbound AM and PM peak-hour trips at each of the High School, the K-8 School, and the Childcare Centre.
- Distribute the trips between the north and the south on North Town Road, using data from Stantec's preliminary traffic review for Waverley West B (see Section 2.1).
- Combine the trip generation forecasts with the directional distribution to estimate the peak hour northbound left-turn volume at each of the School Site accesses on North Town Road.
- Use a rule-of-thumb to estimate the required storage length for the northbound left-turn lanes on North Town Road, based on the AM and PM peak hour volumes.

The following points describe the trip generation review assumptions and results:

- Trip generation for the High School used data from ITE Land Use 530: High School. The K-8 School used data from ITE Land Use 522: Middle/Junior High School. The Childcare Centre used data from ITE Land Use 565: Day Care Centre.
- The *Manual* includes trip generation rates in terms of trips per student and trips per staff member. The study team considered both rates and found that the rates in terms of trips per staff member yielded approximately 20% more trips for the student/staff splits at the Waverley West School Site. Rates in terms of trips per student were (generally) based on a greater number of studies, so the study team considered those rates to be more reliable and used those rates for trip generation forecasts. The base rates include both passenger vehicle trips and bus trips, but for the Waverley West School Site the buses have a separate access at the central bus loop. As a conservative assumption, all trips estimated from the trip generation rates were taken to be passenger vehicle trips and assigned to the High School and K-8 School accesses. Bus trips were estimated separately, as described below.
- Table 13 shows trip generation rates and the estimated trips.

Table 13 - Trip Generation Estimates

Land Use Type	Quantity	Trip Generation Rates	Inbound / Outbound Split	Trip Generation Estimate
High School	1200 students	0.55 AM trips per student 0.33 PM trips per student	68% in / 32% out 32% in / 68% out	825 AM trips (561 in, 264 out) 495 PM trips (158 in, 337 out)
K-8 School	800 students	0.70 AM trips per student 0.35 PM trips per student	55% in / 45% out 46% in / 54% out	700 AM trips (385 in, 315 out) 350 PM trips (161 in, 189 out)
Childcare Centre	176 children	0.79 AM trips per child 0.81 PM trips per child	53% in / 47% out 47% in / 53% out	139 AM trips (74 in, 65 out) 143 PM trips (67 in, 76 out)

The High School access is expected to serve 825 vehicle trips during the weekday AM peak hour and 495 trips during the weekday PM peak hour. The K-8 School access is expected to serve 700 trips during the weekday AM peak hour and 350 trips during the weekday PM peak hour. The Childcare Centre is to have access from the west, via the City of Winnipeg parcel. The Childcare Centre is forecast to generate approximately 140 trips during each of the AM and PM peak hours.

- Stantec's Preliminary Traffic Review for Phase 1 of Waverley West B showed the following directional distribution of trips to/from Waverley West B:

Table 14 - Directional Distribution

Direction	Route	Percentage of all Trips
North		**57%**
	via Waverley Street	36%
	via Kenaston Boulevard	18%
	via North Town Road	3%
South		**17%**
	via Waverley Street	5%
	via Kenaston Boulevard	8%
	via Northbridge	4%
East		**19%**
	via Bison Drive	15%
	via Lee Boulevard	4%
West		**7%**
	via North Town Road	2%
	via Bison Drive	3%
	via South Town Road	2%

- The study team considered that 77% of trips would be coming from/going to the north on North Town Road, including:

  - All 57% of trips bound for the north
  - 2% of trips bound for the west via North Town Road and 3% of trips bound for the west via Bison Drive
  - 15% of trips bound for the east via Bison Drive

  The remaining 23% of trips would be coming from/going to the south on North Town Road, including:

  - All 17% of trips bound for the south
  - 4% of trips bound for the east via Lee Boulevard
  - 2% of trips bound for the west via South Town Road

- With the 77% north / 23% south distribution, the resulting northbound left-turn volumes at the High School and K-8 School were:
  - High School: AM = 561 trips in * 23% = 129 trips
    PM = 158 trips in * 23% = 36 trips
  - K-8 School: AM = 385 trips in * 23% = 89 trips
    PM = 161 trips in * 23% = 37 trips
- Typical traffic engineering practice in Winnipeg considers that unsignalized left-turn lane storage requirements (in metres) can be estimated by multiplying the highest peak hour volume by 0.3. The resulting storage requirements for the northbound left-turn lane at the High School and at the K-8 School were:
  - High School: 129 trips in (AM) * 0.3 = 38.7 m ≈ 40 m
  - K-8 School: 89 trips in (AM) * 0.3 = 26.7 m ≈ 30 m
- Those estimates assume that all trips generated using the ITE trip generation rates are passenger vehicle trips. For the bus trips, the study team considered that Pembina Trails School Division plans to provide 9-12 buses to serve the High School, and 8-10 buses to serve the K-8 School (see Section 2.3.3). Assuming that 12 buses are provided for the High School and 10 buses are provided for the K-8 School and that all buses arrive and leave during one peak hour, there would be 44 peak hour bus trips (22 entering, 22 exiting) at the central bus access. Assuming a critical case where all buses arrive from the south, the northbound left-turn would see 22 buses in the peak hour. The bus access is to be signalized; assuming a cycle length of 60 seconds gives 60 cycles per hour. Assuming the peak hour volume is concentrated in half an hour during the peak hour distributed over the peak hour, all 22 buses would be entering during a 30 minute time period with 30 signal cycles, for an average of 0.73 buses per cycle. That figure can be rounded up to 1 bus per cycle. School buses are approximately 12 m long, so the storage requirement would be 12 m.
- Judgement suggests that bus arrivals could be more concentrated, such that two or three buses may arrive at the same time. If that were to occur, there could be a situation where the

northbound left-turn queue was three buses long. At 12 m per bus, the storage requirement would be 36 m. Constructing the northbound left-turn lane at approximately 36 m long would provide sufficient storage for that queue, while not being excessively long or interfering with any other storage lanes. The study team thus recommends the bus access northbound left-turn lane include 35 m storage.

- All the left-turn lanes at the High School and the central bus access can include 40 m tapers, typical for City of Winnipeg streets with 50 km/h speed limits. There is an access to the east on North Town Road south of the access to the K-8 School, which limits the available length for the taper. The taper at the K-8 School access is thus limited to 20 m long.

The recommended left-turn storage lengths for northbound left-turns on North Town Road and reflected in the site plan are:

- High School Access: 40 m + 40 m taper
- Central Bus Access: 35 m + 40 m taper
- K-8 School Access: 30 m + 20 m taper

Consideration was also given to future northbound left turn storage needs at the intersection of North Town Road and Bison Drive to ensure that the location of the northbound left-in access to the High School does not impact the potential development of a left turn lane at a future Bison Drive signal controlled intersection with North Town Road. Provision of a northbound left turn lane to the High School is critical as its absence would result in a high northbound u-turn demand at the intersection of North Town Road and Bison Drive.

Traffic analysis from Waverley West Area B projects a peak demand of approximately 150 left turns (during the a.m. peak hour) for the northbound left at North Town Road and Bison Drive. Applying a presumed cycle length of 90 to 100 seconds at the intersection equates to a 95th percentile left turn demand between six and eight vehicle which in turn results in a storage requirement of 40 to 50 metres. Consequently, the site plan illustrates a northbound left turn lane at North Town Road and Bison Drive with a 40-metre taper and 40 metre storage lane plus tangent median length between the High School left turn lane and the Bison left turn lane.

Appendix B shows detailed calculations for the trip generation review.

4 SUMMARY AND RECOMMENDATIONS

4.1 Summary

The following points summarize the main parameters and findings of the Traffic and Pedestrian Study:

- The Waverley West School Site is to include a High School, a K-8 School, and a Childcare Centre. Initial "base" capacity is forecast at 1200 students at the High School, 800 students at the K-8 School, and 176 children at the Childcare Centre. Future "maximum" capacity is forecast at 1500 students at the High School, 1000 students at the K-8 School, with the Childcare Centre remaining at 176 children.
- Parking and loading are to be provided on-site for the High School and for the K-8 School. Parking and loading for the Childcare Centre are to be provided from the planned City of Winnipeg recreation centre immediately to the west of the School Site.
- The study team provided input to the development of the site plan (shown on Figure 5 in Section 3.1), estimated requirements for parking and loading, and conducted a trip generation review to help estimate traffic volumes at each of the Site accesses on North Town Road and turn lane storage lengths at those accesses.
- Sustainable site design principles from the Institute of Transportation Engineers (ITE) indicate that the site design should minimize vehicle-pedestrian conflicts, provide priority to pedestrians where vehicle-pedestrians do occur, and prioritize bus access near major trip generators. The study team applied these principles to the site plan through the following design approaches:
    - Passenger vehicle circulation is limited to the edges of the Site, and passenger vehicle circulation is not allowed through the middle of the Site.
    - Conducting Childcare Centre parking and loading from the City of Winnipeg recreation centre to the west allows passenger vehicle circulation to remain at the edges of the Site, rather than circulating through into the middle of the Site.
    - Raised crossings are used to prioritize pedestrians where walking paths cross vehicle circulation routes.
    - Bus access is prioritized through a central bus loop with bus loading near the doors of the High School and the K-8 School.
    - Bike parking is prioritized through bike parking racks near entrances to the High School and the K-8 School.
- Parking and loading requirements were considered from three perspectives:
    - City of Winnipeg requirements per Zoning Bylaw 200/2006.
    - Data from the Institute of Transportation Engineers (ITE) *Parking Generation Manual, 4th Edition*.

- Data from comparable schools in Pembina Trails School Division.

Each of the three perspectives was considered in developing the required parking and loading supplies, which were used in developing the site plan. The final provisions included in the site plan were:

- High School: 215 parking spaces
  192 bike parking spaces
  20 loading positions
  8 bus loading positions
- K-8 School: 100 parking spaces
  156 bike parking spaces
  30 loading positions
  8 bus loading positions

Parking and loading for the Childcare Centre are to be provided on the City of Winnipeg parcel immediately to the west of the School Site, so provision was made for Childcare Centre parking and loading on the site plan.

- The trip generation review found that under the maximum enrollment scenario, the High School access is forecast to serve 825 trips during the AM peak hour, and 495 trips during the PM peak hour. The K-8 School is forecast to serve 700 trips during the AM peak hour, and 350 trips during the PM peak hour. The central bus access is forecast to serve 44 trips during each of the AM and PM peak hours.
  - Resulting northbound left-turn storage requirements on North Town Road are 40 m storage + 40 m taper at the High School, 35 m storage + 40 m taper at the central bus access, and 30 m storage + 20 m taper at the K-8 School access.

4.2 Recommendations

Based on the findings from the Traffic and Pedestrian Study, the study team recommends:

- Develop the Waverley West School Site according to the site plan shown on Figure 5, including the following parking and loading provisions:
  - High School: 215 parking spaces
    192 bike parking spaces
    20 loading positions
    8 bus loading positions
  - K-8 School: 100 parking spaces
    156 bike parking spaces
    30 loading positions
    8 bus loading positions

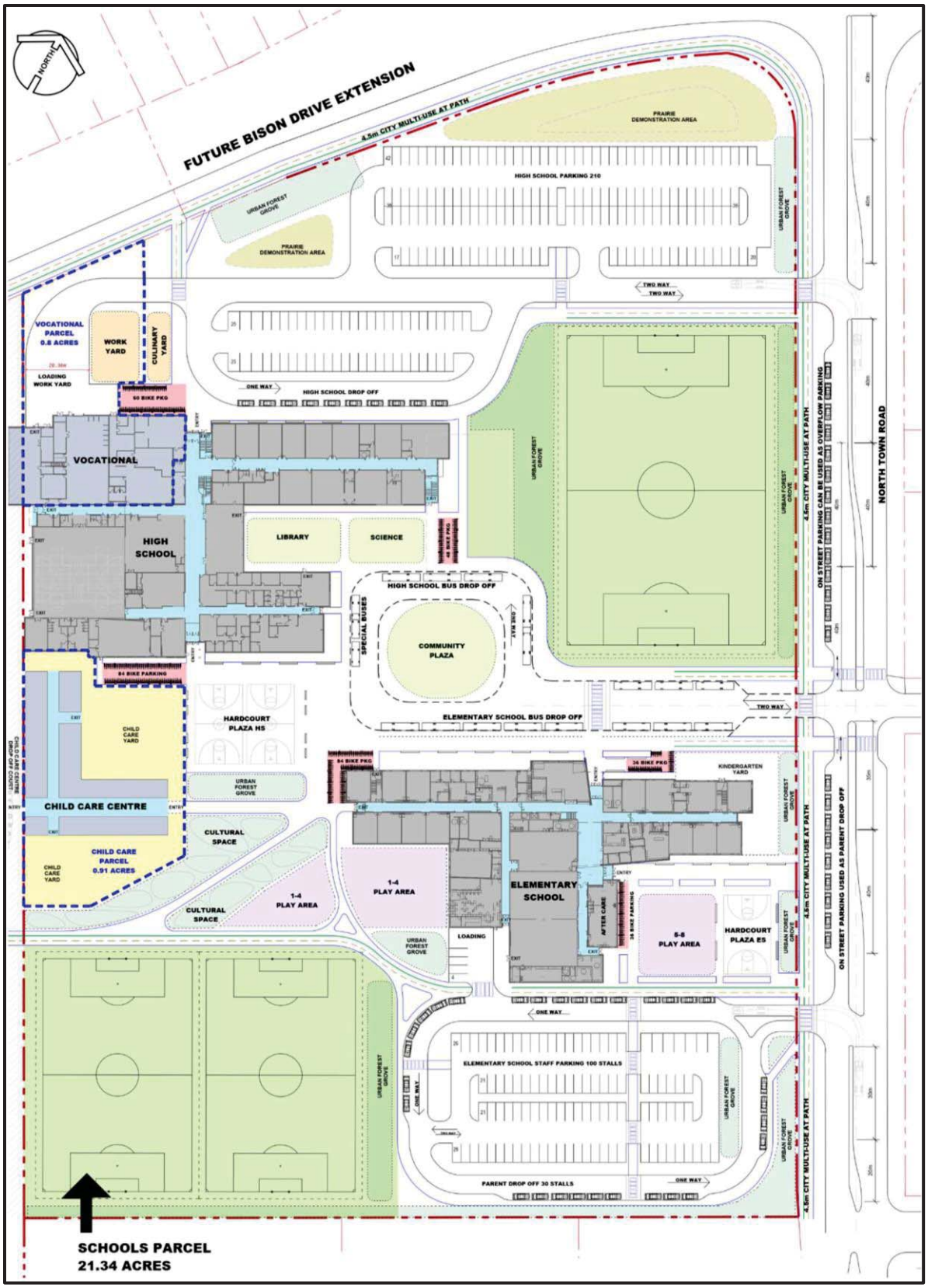

Figure 5 (reprinted from Section 3.1)

- Provide accesses to the School Site from North Town Road, with the following northbound left-turn storage provisions:
    - High School Access: 40 m + 40 m taper
    - Central Bus Access: 35 m + 40 m taper
    - K-8 School Access: 30 m + 20 m taper

APPENDIX A Comparable School Parking and Loading Data

Appendix

	Schools												
	Sample School	**FR**	**VM**	**SP**	**HG**	**WR**	**AC**	**DA**	**AA**	**BO**	**BA**	**SH**	**OP**
Grade Range	4 to 8	10 to 12	9 to 12	K-8	5-9	K-4	7 to 9	K to 6	5 to 9	K-4	K-6	9 to 12	9-12
Number of Students	400	1336	1213	950	630	562	675	540	550	510	415	754	875
Number of Staff	40	132	125	110	67	55	48	64	74	59	54	78	110
Total Parking Spaces Provided On-Site	50	115	104	66	51	50	80	43*	45	33	65	107	152
Staff Parking Spaces Provided On-Site	30	113	112	60	48	44	75	68	43	n/a	54	72	120
Student Parking Spaces Provided On-Site	0	0	0	0	n/a	n/a	0	0	n/a	n/a	0	29	32
Visitor Parking Spaces Provided On-Site	20	2	0	10	1	1	4	0	3	0	14	6	2
Number of Bike Parking Spaces	40	80	30	150	390	50	100	56	250	40	30	3 bike racks	4 racks
Is there a bus loading area provided?	Yes	yes	yes	yes	yes	yes	ublic Stre	d parking l	yes	public street	yes	Yes	yes
Is there a student pick-up and drop-off area provided?	No	yes	yes	yes	no	public street	ublic Stre	street	same as bus	public street	yes	Yes	same as bus
Any of the following issues?													
Insufficient staff parking	No	no	yes	yes	no	not yet	No	no	yes	yes	no	Not yet	no
Insufficient visitor parking	Yes	no	yes	yes	yes	yes	No	yes	yes	yes	yes	Yes	it could add more
Insufficient student parking	No	no	yes	n/a	n/a	n/a	No	n/a	n/a	n/a	no	Yes	no
Insufficient bike parking	No	no	no	yes	no	no	No	no	no	no	no	No	use 1 more rack
Insufficient bus loading space	No	yes	no	no	no	**no?	No	no	no	yes	yes	No	no
Insufficient student pick-up and drop-off space	Yes	yes	yes	yes	yes	yes	No	yes	yes	yes	yes	Yes	yes
Issues on City Streets adjacent to school site	Yes	yes*	yes	yes	yes	yes*	YES!	YES	yes	yes	yes	Yes	yes

ICVMC rents 8 spots from the city that the school pays for

**One parking space

HGI	this is the first year in some time that the parking lot has been full; not an issue yet, as a number of staff park on the street; residents complain intermittently
FRC*	only when the city is doing snow removal
WR*	parking is extremely limited around the school due to city bus stops and two postal superboxes.
WR**	we currently have room for 5 buses so the 10 buses come in two waves; it takes a long time to load buses due to wait time
DA*	we only have 43 number spots on site but staff park along the fence and the back field area

APPENDIX B Trip Generation Review Calculations

Appendix

Enrollment Scenarios

Scenario	Type	Students	Staff
Base	High School	1200	145
	K-8 School	800	94
	Day Care	176	38
Maximum	High School	1500	165
	K-8 School	1000	110
	Day Care	176	38

Notes

- Student and staff figures from draft report Table 2-1.
- Light grey indicates revised enrollment per email from PTSD, received September 3rd.
- Dark grey indicates revised day care capacity as noted by MORR in an email to PTSD, sent September 2nd.

Trip Generation Rates

Type	ITE Land Use	Ind. Var.	Period	# Studies	Rate	% In
High School	530 - High School	Students	Weekday AM Peak Hour of Adjacent Street Traffic	44	0.52	0.67
			Weekday AM Peak Hour of Generator	44	0.55	0.68
			Weekday PM Peak Hour of Adjacent Street Traffic	41	0.14	0.48
			Weekday PM Peak Hour of Generator	58	0.33	0.32
K-8 School	522 - Middle School/Junior High School	Students	Weekday AM Peak Hour of Adjacent Street Traffic	22	0.58	0.54
			Weekday AM Peak Hour of Generator	18	0.7	0.55
			Weekday PM Peak Hour of Adjacent Street Traffic	21	0.17	0.49
			Weekday PM Peak Hour of Generator	20	0.35	0.46
	520 - Elementary School	Students	Weekday AM Peak Hour of Adjacent Street Traffic	35	0.67	0.54
			Weekday AM Peak Hour of Generator	34	0.65	0.54
			Weekday PM Peak Hour of Adjacent Street Traffic	37	0.17	0.48
			Weekday PM Peak Hour of Generator	34	0.34	0.45
Day Care	565 - Day Care Center	Students	Weekday AM Peak Hour of Adjacent Street Traffic	75	0.78	0.53
			Weekday AM Peak Hour of Generator	75	0.79	0.53
			Weekday PM Peak Hour of Adjacent Street Traffic	75	0.79	0.47
			Weekday PM Peak Hour of Generator	75	0.81	0.47

Notes

- All trip generation rates are taken from the general urban/suburban context

Trip Generation

- Maximum enrollment scenario
- Rates for Peak Hour of Generator
- K-8 School using ITE 522, consistent with ITE 522 for Parking Generation estimates

Land Use	Quantity	Ind. Var.	Period	# Studies	Rate	% In	Trips	In	Out
High School	1500	Students	Weekday AM Peak Hour of Generator	44	0.55	0.68	825	561	264
K-8 School	1000	Students	Weekday AM Peak Hour of Generator	18	0.7	0.55	700	385	315
Day Care	176	Students	Weekday AM Peak Hour of Generator	75	0.79	0.53	139	74	65
High School	1500	Students	Weekday PM Peak Hour of Generator	58	0.33	0.32	495	158	337
K-8 School	1000	Students	Weekday PM Peak Hour of Generator	20	0.35	0.46	350	161	189
Day Care	176	Students	Weekday PM Peak Hour of Generator	75	0.81	0.47	143	67	76

Directional Distribution

- From Stantec memo Table 3

Direction		
North		57%
	via Waverley	36%
	via Kenaston	18%
	via North Town Road	3%
South		17%
	via Waverley	5%
	via Kenaston	8%
	via Northbridge	4%
East		19%
	via Bison	15%
	via Lee	4%
West		7%
	via North Town Road	2%
	via Bison	3%
	via South Town Road	2%

Mode Split

- Assume ITE rates are representative of near-term mode splits.
- Longer term may see more of a shift to walking & cycling (& maybe more transit?)
- Likely to see maximum enrollment & lower auto mode split over the long term.
- Likely to see base enrollment & ITE mode split in the near term.
- Our projections use maximum enrollment & ITE mode split--critical case vehicle trip gen.

Assignment

- Need to convert directional distribution to north/south distribution on North Town Road.
- Assume full street network build out per Stantec memo Figure 1. Bison complete from Kenaston to Waverley, North Town Road complete, connection to Lee, connection to South Town Road, etc.

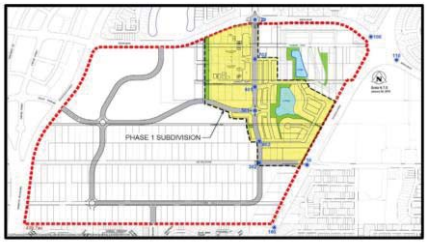

Figure 1 Location Context of Waverley West B

- High school and K-8 school will have access from North Town Road, Day Care will have access from collector via Bison Drive.
- With these assumptions, resulting opening ultimate assignment is:
  - to/from the North on North Town Road: 77%
    - 57% north
    - 5% west via Bison, NTR
    - 15% east via Bison
  - to/from the South on North Town Road: 23%
    - 17% south
    - 4% east via Lee
    - 2% west via STR

- Assume Day Care has access from collector connected to Bison Drive--no impact on North Town Road.

- Resulting assignment (assuming all trips are passenger vehicle--no reduction for buses, which will use the central bus access)

Weekday AM Peak Hour of Generator

Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Total
High School Access	129	243			296	432	203		61				1364
Bus Access		372			357								729
K-8 School Access	89	129			61	296	243		72				890

Weekday PM Peak Hour of Generator

Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Total
High School Access	36	146			124	122	259		78				765
Bus Access		182			202								384
K-8 School Access	37	36			78	124	146		43				464

- Storage required (max volume * 0.3)

High School Access	38.7	m
K-8 School Access	26.7	m