ORIGINAL: APRIL 29, 2024
UPDATE: JUNE 25, 2025

PROJECT NO: 2514-6796

Township of Southgate
Planning Services
185667 Grey County Road 9
Dundalk, Ontario N0C 1B0

Grey County
Land Use Planning
595 9th Ave East
Owen Sound, Ontario N4K 3E3

Attention: **Bill White**
Municipal Planner, Township of Southgate

Stephanie Lacey-Avon
Senior Planner, Grey County

RE: **271 MAIN STREET**
TRAFFIC OPINION LETTER UPDATE
TOWNSHIP OF SOUTHGATE

To Stephanie and Bill,

This updated Traffic Opinion Letter has been prepared to support the proposed Site Plan Application for the development of the site located at 271 Main Street East in the Village of Dundalk, Township of Southgate. This letter addresses comments received from the Township's peer review Triton Engineering and assesses the proposed development from a transportation operations and safety perspective.

We have divided this letter into the following sections:

- Background
- Development Proposal
- Boundary Road Network
- Trip Generation and Distribution
- Operational Analysis
- Access Safety
- Site Circulation and Vehicle Maneuverability
- Parking Review
- Conclusions

A Terms of Reference was established with the Township and County. **Attachment A** includes the Terms of Reference correspondence. Comments were received on the April 2024 letter prepared by our office from Triton Engineering, dated October 2, 2024. A subsequent call between Crozier and Triton Engineering on January 30th, 2025 (K.Hagan/T.Kramp) clarified the comments. This update includes a revision of the vehicle turning movements and the inclusion of traffic modelling at the site access to address the comments received.

Background

The subject lands cover an area of approximately 0.26 ha and currently consist of vacant land with a few trees. The property fronts onto Main Street East and is zoned as vacant residential land not on water. **Attachment B** includes relevant zoning map excerpts.

Development Proposal

The proposed development includes 20 three-storey townhouse units. Access to the site will be provided through the existing site access to County Road 9/Main Street East.

Attachment C includes the proposed Site Plan (Orchard Design Studio Inc, June 25, 2025).

Boundary Road Network

County Road 9/Main Street East is an east-west roadway with a two-lane cross-section. County Road 9/Main Street East is an arterial road under the County of Grey jurisdiction. Within the study area the roadway has a posted speed limit of 40 km/h with 1.5 m sidewalks on both sides of the road and no designated cycling facilities.

Trip Generation and Distribution

Trip generation for the proposed development was forecasted using published data from the ITE Trip Generation Manual, 11th Edition. The ITE Trip Generation Manual is a compendium of industry collected trip generation data across North America for a variety of land uses and is used industry wide as a source for trip generation forecasts.

Land Use Code (LUC) 215 "Single-Family Attached Housing" was applied to the proposed 20 townhouses. **Table 1** outlines the average rate trip generation for the proposed development. Please note that the average rate is more conservative than the fitted curve equation provided by ITE. **Attachment D** contains relevant excerpts from the ITE Trip Generation Manual, 11th Edition.

Table 1: Site Trip Generation

ITE Land Use Category	Units	Peak Hour	Trips Generated		
			Inbound	Outbound	Total
LUC 215 "Single-Family Attached Housing"	20	A.M.	2	8	10
		P.M.	7	4	11

The proposed development is expected to generate 10 and 11 total two-way trips during the weekday a.m. and p.m. peak hours, respectively. It is anticipated that the majority of residents will travel into the centre of Dundalk or to Highway 10 during the peak hours.

Operational Analysis

To confirm the impact of the development on the road network, Triton Engineering requested the site access be assessed to ensure left turn queuing on Main Street does not impact the intersection with Owen Sound Street to the east.

Historical data collected at the intersection of Osprey Street and Main Street in 2022 was grown by 2% per year to establish the volumes on Main Street at the site access as of 2025. Site volumes

were then assigned in the out of the access under peak hour conditions. 100% of volumes were assumed to arrive from and depart to the east of the site, which would represent a worst-case scenario for left-turn queuing on Main Street. Synchro Modelling Software was used to assess the forecasted operations at the site access. **Table 2** outlines the findings.

Table 2: Site Access Operations

Location	Peak Hour	Level of Service	Delay	Volume-to-Capacity Ratio	95th Percentile Queue
Site Access & Main Street	AM	B	10.0 s (NB) 0.1 s (WB)	0.17 (EB)	0.3 m (NB) 0.0 m (EB/WB)
	PM	A	9.9 s (NB) 0.3 s (WB)	0.17 (EB)	0.1 m (NB) 0.2 m (WB)

The site access is anticipated to operate acceptably with minor delay to traffic existing the site (10.0 s in the a.m. peak hour), as well as vehicles turning from Main Street into the site (0.03 s in the p.m. peak hour). The forecasted 95th percentile queue on Main Street is expected to be 0.2 meters, or one vehicle. As the intersection of Owen Sound Street is more than 30 m centerline-to-centerline from the access there are no anticipated concerns with the proposed access impacting the intersection. These results reflect the relatively low volume of opposing (eastbound) vehicles on Main Street, which allow numerous gaps for inbound vehicles.

Attachment E includes the historic traffic data, the trip assignment and the synchro analysis for reference.

It is noted that a number of ongoing and proposed developments within Dundalk have provided or proposed improvements to the boundary road network which will improve traffic operations and connectivity with Dundalk as a whole.

Site Access Review

Access Safety

Sight lines were considered from two perspectives: intersection sight distance and stopping sight distance.

Intersection sight distance refers to the minimum distance required for a vehicle to enter a road and attain the assumed operating speed before being overtaken by a vehicle approaching in the same direction at the design speed. Stopping sight distance refers to the minimum distance required for a vehicle to slow down or stop to avoid collision with a vehicle egressing the site.

County Road 9/Main Street East has a posted speed limit of 40 km/h. Accordingly, a design speed of 50 km/h was selected, reflecting a 10 km/h increase to the posted speed limit, as is typical for lower speed roads.

Intersection Sight Distance

Section 9.9 of the Transportation Association of Canada Geometric Design Guidelines for Canadian Roads (TAC GDGCR) provides intersection sight distance for different intersection control types. The applicable cases are as follows:

- Case B – Intersections with stop control on the minor road
  - Case B1 – Left turn from the minor road (Site Access)
  - Case B2 – Right turn from the minor road (Site Access)

Intersection sight distance is calculated using equation 9.9.1 from the GDGCR as outlined below:

$$ISD = 0.278 * V\ major * t_G$$

Where;
ISD = Intersection Sight Distance
Vmajor = design speed of roadway (km/h)
t_G = assumed time gap for vehicles to turn from stop onto roadway (s)

The calculated and design sight distance is further summarized in TAC GDGCR Table 9.9.6 for vehicles turning right from stop and Table 9.9.4 for vehicles turning left from stop. **Table 3** summarizes the site distance calculations. It is concluded that the sight distance requirements are met at the site access.

Table 3: Site Distance Analysis

Feature	County Road 9/Main Street East Site Access
Access Type	Full-Movement
Posted Speed Limit of Roadway	40 km/h
Assumed Design Speed	50 km/h
Base Time Gap	6.5 s (right), 7.5 s (left)
Grade of Roadway	Less than 3%
Required Sight Distance (right turn)	95 m
Available Sight Distance (right turn)	> 200 m
Required Sight Distance (left turn)	105 m
Available Sight Distance (left turn)	> 200 m
Minimum Sight Distances Satisfied?	Yes

Stopping Sight Distance

Per TAC GDGCR Table 2.5.2, the stopping sight distance for vehicles on a 50 km/h design speed roadway is 65 meters. **Attachment F** includes relevant excerpts from TAC GDGCR.

As noted above, the proposed site access location allows for sufficient visibility to the east and west of the site, with the available 200 m exceeding the minimum stopping sight distance requirement of 65 m. Therefore, no stopping sight distance issues are anticipated.
The full moves access can be supported from both an intersection turning and stopping sight distance perspective.

Access to Access Spacing

Access to access spacing is the distance between existing or future driveways. **Table 4** outlines the required and provided access spacing per Figure 8.9.2 in TAC GDGCR.

Table 4: Access to Access Spacing

Feature	Site Access to East Driveway	Site Access to West Driveway
Minimum Spacing Requirement	1.0 m	1.0 m
Available Spacing	28 m	16 m
Minimum Spacing Distance Satisfied?	Yes	Yes

The site driveway will have adequate spacing from neighbouring driveways. The Site Access is approximately 30 m centerline to centerline from Owen Sound Street to the east and 125 m from Osprey Street to the west. The access is provided in the centre of the site frontage and has maximized the available spacing for the number of units provided. Queuing of westbound vehicles turning into the site are not anticipated to impact the intersection of Main Street and Owen Sound Street as demonstrated in the Operational Analysis section of this letter.

Site Circulation and Truck Turning

A truck turning analysis was undertaken to support the development application and the proposed site layout. The truck turning analysis was completed using AutoTURN modelling software and the following design vehicles were assessed: fire truck, garbage truck, and snow removal vehicle.

As illustrated on the attached drawings, all design vehicles can manoeuvre through the site without any conflicts to internal drive aisles, parking stalls or curbs. The vehicle manoeuvring diagrams are included in **Attachment G**.

Parking Review

An evaluation of the parking requirements associated with the proposed development was undertaken to determine whether the proposed parking supply can meet the required parking outlined in the parking Zoning By-Law.

The proposed development meets the description of Dwellings - Detached, Semi-detached Duplex, Converted under the Township of Southgate Zoning By-law No. 19-2002 (consolidated January 2025) Section 5.7 Parking Regulations. The parking requirements for the development are outlined in **Table 5.**

Table 5: Township of Southgate By-Law Parking Requirements

Land Use	Parking Rates	Proposed Number of Units	Required Number of Parking Spaces	Proposed Number of Parking Spaces	Surplus/ Deficiency
Townhouse Dwellings	2 per dwelling unit	20	40	42	**+2**

As outlined in **Table 5,** the site is proposing a surplus of two parking spaces above the requirement outlined in the Township of Southgate Zoning By-law.

Conclusions

The proposed residential development is anticipated to generate 10 and 11 two-way trips in the a.m. and p.m. peak hours, respectively. Modelling analysis undertaken at the site access forecast minimal delay to traffic volumes and remaining capacity on the road network. There are no anticipated concerns with queuing at the site access impacting the intersection of Main Street and Owen Sound Street.

The proposed development is not expected to create a safety hazard due to vehicle ingress or egress at the site access onto County Road 9/Main Street East. At the location of the proposed site access, the available intersection sight distance, stopping sight distance, and access to access spacing to the east and west of the access is more than the minimum requirements outlined in the TAC GDGCR.

Vehicle maneuvering diagrams illustrate fire truck, garbage truck, and snow removal vehicles can turn into and out of the site within the existing roadway shoulder and the proposed access width and are not anticipated to impact parked vehicles or fencing internal to the site.

The development proposes a surplus of parking spaces over what is required by Township of Southgate Zoning By-law No. 19-2002.

The analysis undertaken herein was prepared using the most recent Site Plan. Any minor changes to the Plan will not materially affect the conclusions contained within this report. The proposed residential development at 271 Main Street East can be supported from a transportation safety and operations perspective with the existing geometry of the roadway.

Should you have any questions or require any further information, please contact the undersigned.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

[redacted]

Alexander Fleming, P. Eng, MBA
Partner, Vice President of Transportation

C.F. CROZIER & ASSOCIATES INC.

[redacted]

Engineering Intern, Transportation

J:\2500\2514 - Countryside Communities Inc\6796 - 271 Main Street East Dundalk\Letters\6796_TOL\6796_Traffic Opinion Letter Update.docx

Encl.
Attachment A – Terms of Reference Communications
Attachment B – Relevant Zoning Excerpts
Attachment C – Site Plan (Orchard Design Studio Inc, June 24, 2025)
Attachment D – ITE Trip Generation Manual, 11th Edition
Attachment E – Traffic Data and Analysis
Attachment F – TAC GDGCR Excerpts
Attachment G – Vehicle Maneuvering Diagrams

Attachment A

Terms of Reference Communications

Kerianne Hagan

From: Dustin Lyttle <dlyttle@tritoneng.on.ca>
Sent: November 2, 2023 12:46 PM
To: Kerianne Hagan; planning@grey.ca
Cc: jellis@southgate.ca; Clinton Stredwick; Howard Wray
Subject: RE: 271 Main Street Dundalk Terms of Reference

Categories: Filed to Sharepoint

Hi Kerianne,

Just as a point of clarification, the Township will defer to the County to confirm the TOR since this is a County managed road.

Thanks,
Dustin C. Lyttle, P. Eng.

Triton Engineering Services Limited
105 Queen Street West, Unit 14 Fergus, ON N1M 1S6
Tel - (519) 843-3920 ext.222 • Cell - (519) 362-7649 • www.tritoneng.on.ca

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From: Kerianne Hagan <khagan@cfcrozier.ca>
Sent: Thursday, November 2, 2023 11:40 AM
To: planning@grey.ca; Dustin Lyttle <dlyttle@tritoneng.on.ca>; Howard Wray <hwray@tritoneng.on.ca>
Cc: jellis@southgate.ca; Clinton Stredwick <cstredwick@dcslade.ca>
Subject: RE: 271 Main Street Dundalk Terms of Reference

Good Morning,

I am looking to follow up on this TOR request.
Grey County has forwarded the previous request on to their Transportation Department through Scott Taylor.

We are looking to move forward with the TOL as soon as possible.
Thank you all,
Kerianne

Kerianne Hagan, EIT
Engineering Intern, Transportation
Office: 705.446.3510
Collingwood | Milton | Toronto | Bradford | Guelph

From: Kerianne Hagan
Sent: Tuesday, October 24, 2023 8:19 AM
To: Scott Taylor <scott.taylor@grey.ca>; Dustin Lyttle <dlyttle@tritoneng.on.ca>; Howard Wray <hwray@tritoneng.on.ca>
Cc: jellis@southgate.ca; Clinton Stredwick <cstredwick@dcslade.ca>
Subject: 271 Main Street Dundalk Terms of Reference

Good Morning,

C.F. Crozier & Associates has been retained to provide transportation engineering services in support of a Site Plan Application (SPA) for the site at 271 Main Street E in Dundalk, Township of Southgate, Grey County.

We have reached out to you all based on past work in Dundalk. If there is another contact we should circulate this correspondence to, please let us know.

We are seeking confirmation of the following Terms of Reference:

Given the small number of trips generated by the proposed 32 stacked townhouse units (11 and 15 two-way trips in the a.m. and p.m. peak hours, respectively), we propose a scoped transportation analysis in the form of a Traffic Opinion Letter to qualitatively assess the impacts of the proposed development. The Traffic Opinion Letter will include the following:

1. Forecast the trip generation based on the ITE Trip Generation Manual, 11th Edition.
2. Review the expected trip distribution and qualitatively assess the potential traffic impacts.
3. Review the active transportation connections proposed internal to the site and the boundary road network, proposed sidewalks, and bicycle parking, as well as pedestrian and cycling circulation.
4. Assess site circulation including preparation of vehicle maneuvering diagrams
5. Review the minimum parking requirements for the site based on the Township of Southgate's Zoning Bylaw 19-2002.
6. Review the proposed geometric design elements of the access to Main Street
    - This will include intersection spacing, sight distance, daylighting triangles and intersection angles

We trust the above is acceptable. Should you have any questions or concerns, please feel free to contact us.

Thank you,
Kerianne

Kerianne Hagan

From: Stephanie Lacey-Avon <Stephanie.Lacey-Avon@grey.ca>
Sent: November 3, 2023 8:58 AM
To: Kerianne Hagan; Group: Planning Dept Emails; Dustin Lyttle; Howard Wray
Cc: jellis@southgate.ca
Subject: RE: 271 Main Street Dundalk Terms of Reference

Categories: Filed to Sharepoint

Hi Kerianne,

I apologize for the delay – our transportation department have had the opportunity to review the proposed ToR for this development and are satisfied with the scope. Generally, these are the conditions that TS will be looking for through the formal application process:

- As a condition of approval, road widening of 17 feet (5.18 meters) shall be conveyed to the County of Grey along the frontage of the County Road for both the severed and retained parcels, where applicable. This shall be legally conveyed at the expense of the applicant.
- As a condition of approval, a 0.3 meter reserve shall be conveyed to the County of Grey along the frontage of the County Road, to prevent future laneway access onto the County Road. This shall be legally conveyed at the expense of the applicant.
- Following any approval of the subject application, the applicant shall apply to the County of Grey for an entrance permit, to permit a new entrance onto the County Road (if applicable as there appears to be a rough double entrance to the lot currently).
- Drainage plan required to ensure post development discharge to county road is equal to pre development discharge.

These comments, in addition to potentially others will be formally submitted through the planning application process once received for formal review.

Please reach out if you have any questions.

Thank you,

Stephanie Lacey-Avon
Senior Planner
Phone: +1 519-372-0219 ext. 1296

From: Kerianne Hagan <khagan@cfcrozier.ca>
Sent: Thursday, November 2, 2023 11:40 AM
To: Group: Planning Dept Emails <planning@grey.ca>; Dustin Lyttle <dlyttle@tritoneng.on.ca>; Howard Wray <hwray@tritoneng.on.ca>
Cc: jellis@southgate.ca; Clinton Stredwick <cstredwick@dcslade.ca>
Subject: RE: 271 Main Street Dundalk Terms of Reference

[EXTERNAL EMAIL]

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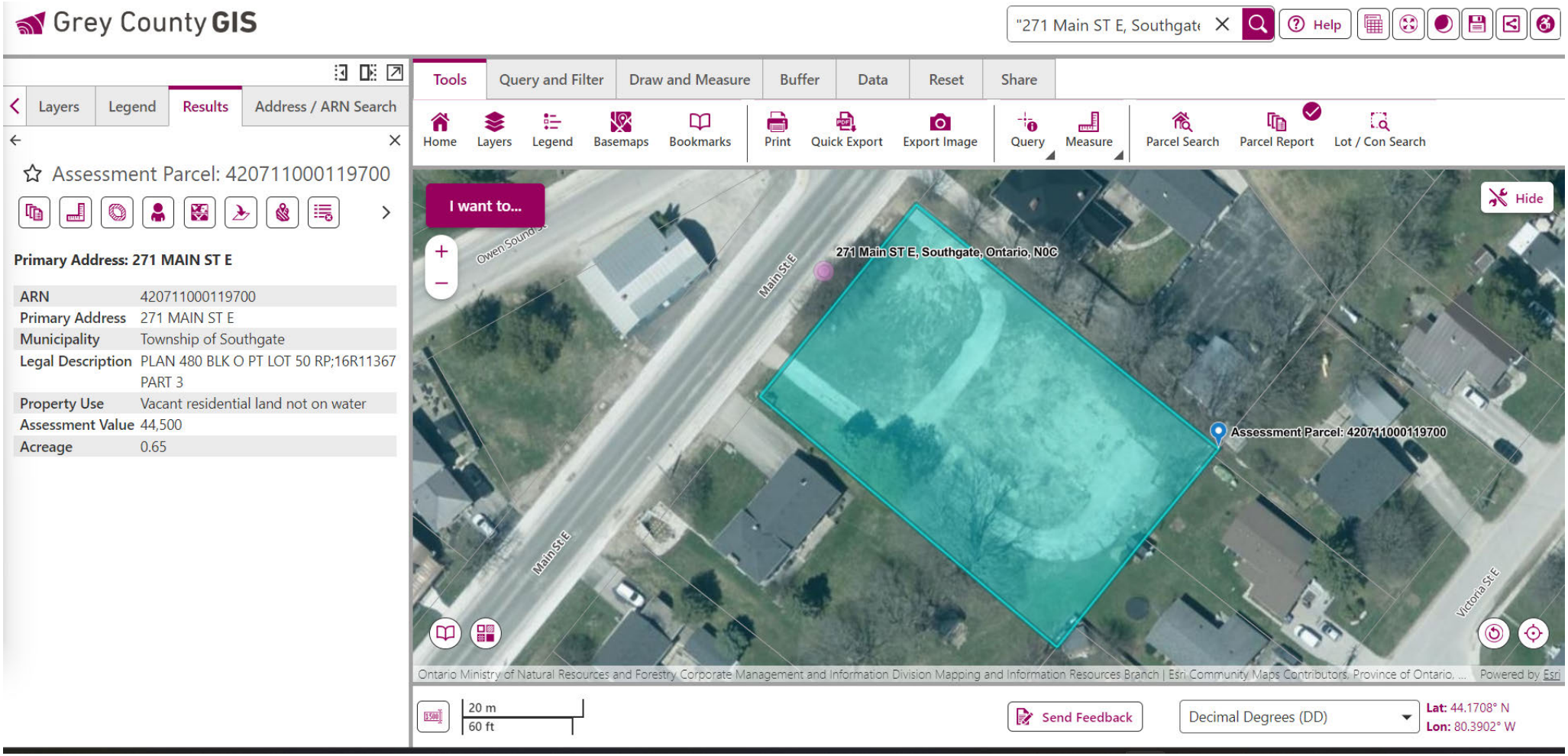
Thank you,
Kerianne

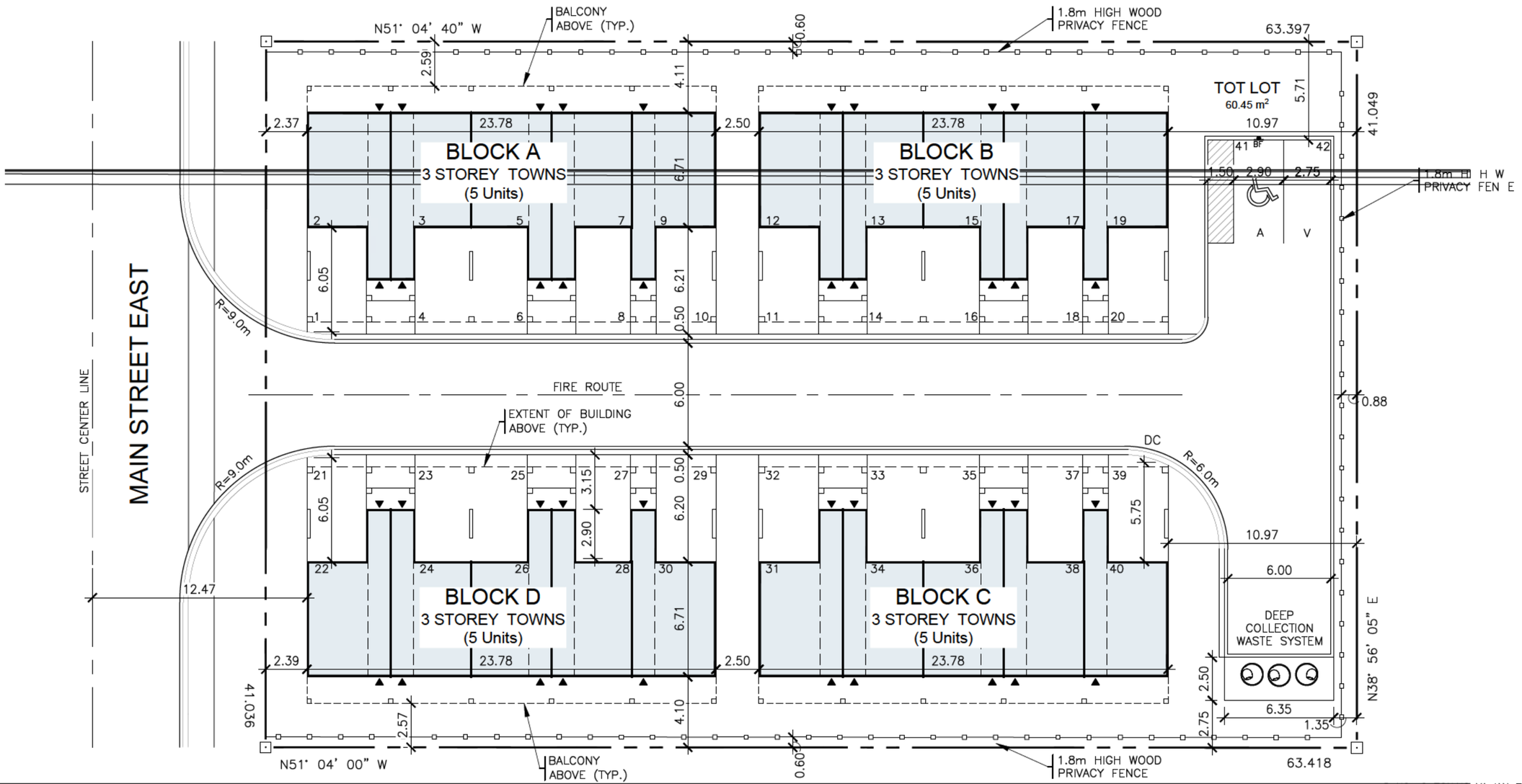
Attachment B

Relevant Zoning Excerpts


Grey County GIS
"271 Main ST E, Southgat
Help
Layers
Legend
Results
Address / ARN Search
Assessment Parcel: 420711000119700
Primary Address: 271 MAIN ST E
ARN 420711000119700
Primary Address 271 MAIN ST E
Municipality Township of Southgate
Legal Description PLAN 480 BLK O PT LOT 50 RP;16R11367 PART 3
Property Use Vacant residential land not on water
Assessment Value 44,500
Acreage 0.65
Tools
Query and Filter
Draw and Measure
Buffer
Data
Reset
Share
Home
Layers
Legend
Basemaps
Bookmarks
Print
Quick Export
Export Image
Query
Measure
Parcel Search
Parcel Report
Lot / Con Search
I want to...
Hide
271 Main ST E, Southgate, Ontario, N0C
Assessment Parcel: 420711000119700
Main St E
Victoria St E
Ontario Ministry of Natural Resources and Forestry Corporate Management and Information Division Mapping and Information Resources Branch | Esri Community Maps Contributors, Province of Ontario, ...
Powered by Esri
20 m
60 ft
Send Feedback
Decimal Degrees (DD)
Lat: 44.1708° N
Lon: 80.3902° W

Attachment C

Site Plan (Orchard Design Studio Inc, June 25, 2025)



*DENOTES ZONING VARIANCE

UNITS BREAKDOWN

NUMBER OF BEDROOMS	AREA	NUMBER OF UNITS
3 BEDROOM UNIT	126.0 sq. m (1,356 sq. ft.)	20

PARKING

NUMBER OF PARKING SPACES	REQUIRED	PROPOSED
	2.0 PER UNIT = 40 SPACES	20 WITHIN GARAGE 20 DRIVEWAYS + 1 VISITOR + 1 B.F. SPACE= 42 SPACES

SNOW STORAGE

SNOW TO BE SHIPPED OFF SITE.

EXISTING ZONING R3 - 10.1 (e)
PROPOSED SITE SPECIFIC ZONING

REGULATION	REQUIRED	PRO E
LOT FRONTAGE	40 m	41. m
LOT AREA	1,200 sq.m	2,602. .m
UNITS ALLOWED (MAXIMUM)	LOT AREA (2,602.3 sq.m) / 300 = 8 UNITS	* 20 UNIT
LOT COVERAGE (MAXIMUM)	910.8 sq.m (35%)	*1,159.52 .m 44. %
FRONT YARD (MINIMUM)	7.5 m	*2. 7 m
INTERIOR SIDE YARD (MINIMUM)	4.0 m	4.1 m
REAR YARD (MINIMUM)	10.0 m	10. 7 m
FLOOR AREA (MINIMUM)	3 BEDROOM: 83 sq.m	3 BEDROOM: 1 . .m
BUILDING HEIGHT (MAXIMUM)	3 STOREYS	3 ST EY
PLAY SPACE (MINIMUM)	104.0 sq.m	*60.4 .m
AMENITY SPACE (MINIMUM)	1120.0 sq.m	*596.7 .m 391.0 sq.m BACK YA VATE 145.3 sq.m BAL NY VATE 60.45 sq.m AMENITY MM N

North Arrow

True North:

ORCHARD DESIGN STUDIO INC.
marketingmeetsarchitecture

CALE BARNES

MAIN ST. EAST TOWNS
271 MAIN STREET EAST, DUNDALK, ON

Set Issuance

No.	Date	Description
4	2024-07-30	REVISED AS PER CITY
5	2024-11-07	REVISED AS PER CLIENT
6	2024-12-20	REVISED FOOTPRINTS
7	2025-03-12	CURB REVISIONS
8	2025-06-25	ISSUED FOR SPA

Sheet Information

SITE PLAN

Project No. 15572
Project Start Date: 2024-01-25
File: 271 Main Street - Site Plan.dwg
Drawn by: J.P.
Scale: 1:250

SPA

A1.01

Plot Date | Time - 2025-07-02 8:32:14 AM

P:\1-Projects\Cale Barnes\15572_271 Main Street\2-Drawings\

Attachment D

ITE Trip Generation Manual, 11th Edition

Land Use: 215
Single-Family Attached Housing

Description

Single-family attached housing includes any single-family housing unit that shares a wall with an adjoining dwelling unit, whether the walls are for living space, a vehicle garage, or storage space.

Additional Data

The database for this land use includes duplexes (defined as a single structure with two distinct dwelling units, typically joined side-by-side and each with at least one outside entrance) and townhouses/rowhouses (defined as a single structure with three or more distinct dwelling units, joined side-by-side in a row and each with an outside entrance).

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in British Columbia (CAN), California, Georgia, Illinois, Maryland, Massachusetts, Minnesota, New Jersey, Ontario (CAN), Oregon, Pennsylvania, South Dakota, Utah, Virginia, and Wisconsin.

Source Numbers

168, 204, 211, 237, 305, 306, 319, 321, 357, 390, 418, 525, 571, 583, 638, 735, 868, 869, 870, 896, 912, 959, 1009, 1046, 1056, 1058, 1077

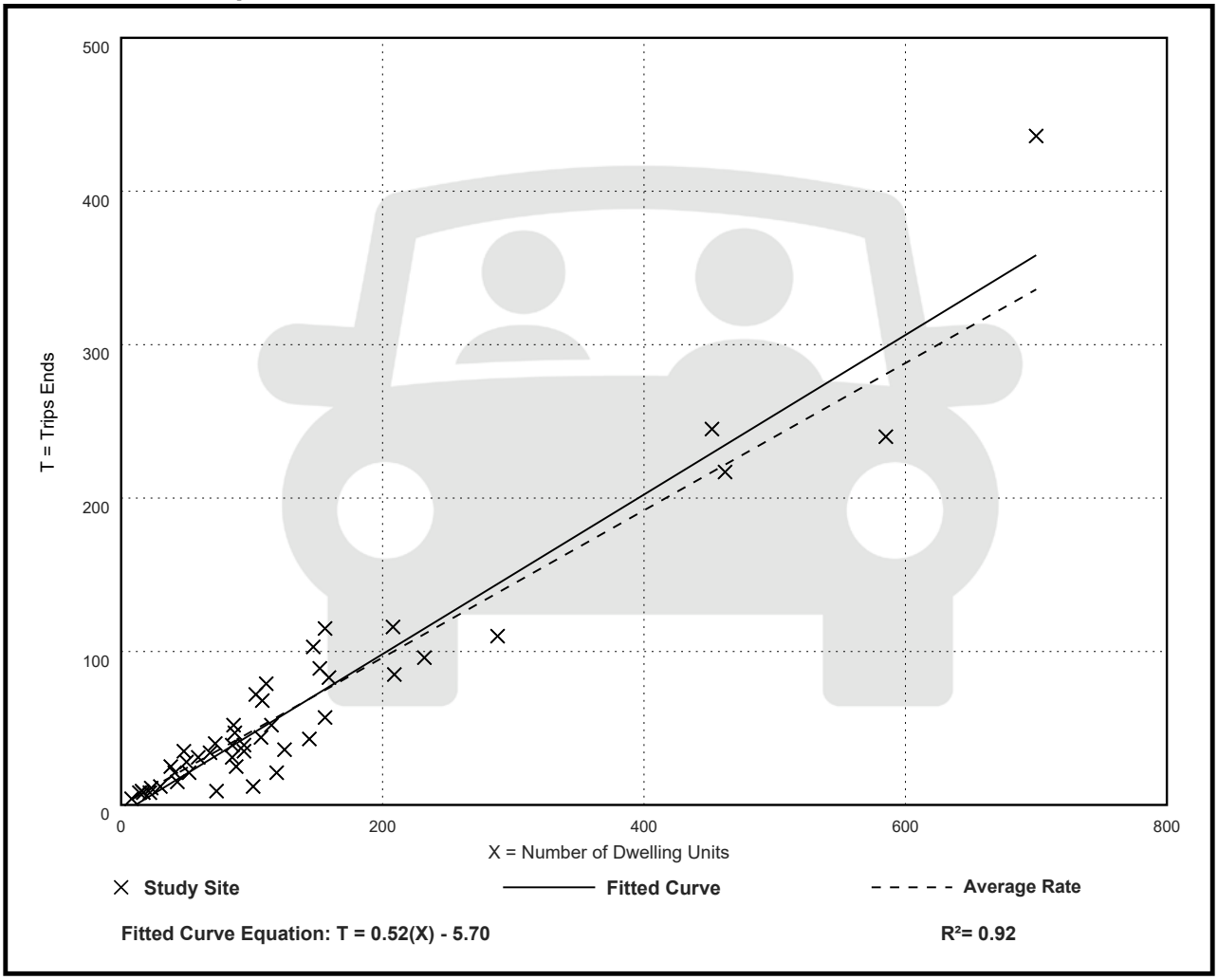
Single-Family Attached Housing
(215)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 46
Avg. Num. of Dwelling Units: 135
Directional Distribution: 31% entering, 69% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.48	0.12 - 0.74	0.14

Data Plot and Equation



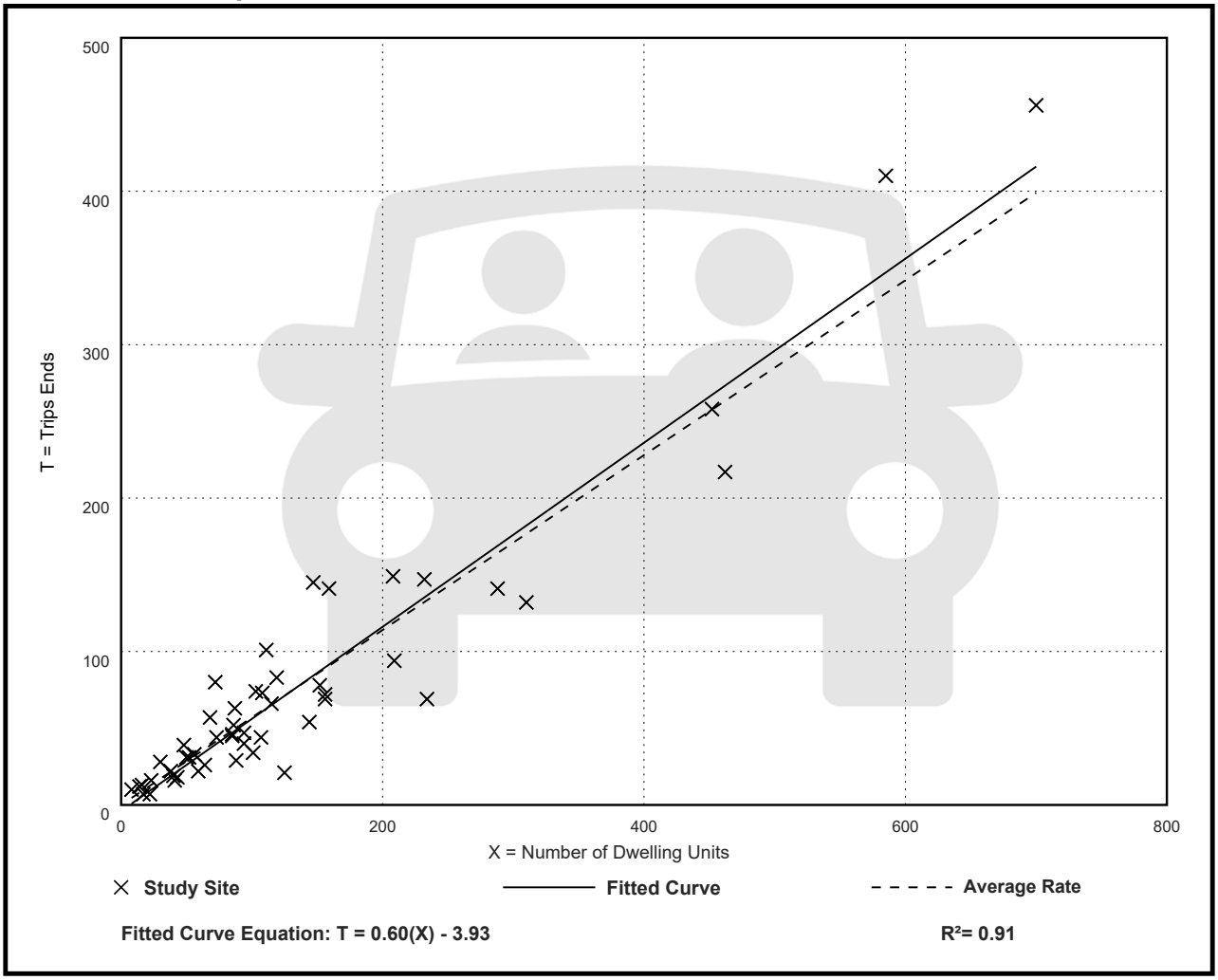
Single-Family Attached Housing
(215)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 51
Avg. Num. of Dwelling Units: 136
Directional Distribution: 57% entering, 43% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.57	0.17 - 1.25	0.18

Data Plot and Equation



Attachment E

Traffic Data and Analysis

Spectrum

Turning Movement Count
Location Name: MAIN ST & OSPREY ST
Date: Tue, Oct 04, 2022 Deployment Lead: Peter Ilias

Crozier & Associates
SUITE 301 40 HURON STREET
COLLINGWOOD ONTARIO, L9Y 4R3
CANADA

Turning Movement Count (4 . MAIN ST & OSPREY ST)

Start Time	N Approach OSPREY ST						E Approach MAIN ST						S Approach OSPREY ST						W Approach MAIN ST						Int. Total (15 min)	Int. Total (1 hr)
	R ght N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Tota	R ght E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Tota	R ght S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Tota	R ght W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Tota		
06:00:00	0	0	7	0	0	7	1	19	0	0	0	20	0	0	0	0	1	0	0	41	0	0	0	41	68	
06:15:00	1	0	3	0	0	4	1	24	0	0	0	25	0	1	1	0	0	2	1	38	0	0	0	39	70	
06:30:00	0	0	5	0	0	5	0	25	1	0	0	26	1	0	1	0	0	2	0	39	0	0	0	39	72	
06:45:00	1	0	5	0	0	6	0	24	1	0	0	25	0	0	3	0	0	3	1	32	0	0	1	33	67	277
07:00:00	0	0	8	0	0	8	0	29	0	0	1	29	4	1	2	0	2	7	0	39	0	0	0	39	83	292
07:15:00	3	0	9	0	0	12	1	45	0	0	0	46	1	0	1	0	0	2	0	47	1	0	0	48	108	330
07:30:00	1	0	3	0	0	4	0	40	1	0	1	41	0	1	2	0	0	3	1	49	0	0	0	50	98	356
07:45:00	1	0	8	0	1	9	1	37	2	0	0	40	3	1	1	0	0	5	1	43	0	0	0	44	98	387
08:00:00	0	0	3	0	1	3	0	54	0	0	0	54	2	0	2	0	0	4	0	41	2	0	0	43	104	408
08:15:00	1	0	5	0	1	6	0	47	0	0	0	47	1	0	7	0	0	8	1	45	1	0	0	47	108	408
08:30:00	1	2	4	0	0	7	0	49	2	0	0	51	4	1	6	0	1	11	1	60	0	0	0	61	130	440
08:45:00	1	0	3	0	2	4	0	41	0	0	0	41	3	2	1	0	1	6	1	68	1	0	0	70	121	463
09:00:00	0	0	1	0	2	1	1	43	2	0	1	46	3	0	0	0	3	3	1	50	5	0	0	56	106	465
09:15:00	1	0	3	0	0	4	2	34	3	0	0	39	0	0	1	0	0	1	1	39	1	0	1	41	85	442
09:30:00	2	0	1	0	2	3	0	37	1	0	0	38	2	0	0	0	0	2	2	39	0	0	0	41	84	396
09:45:00	0	0	0	0	2	0	1	34	0	0	0	35	2	0	1	0	0	3	0	46	0	0	0	46	84	359
BREAK																										
15:00:00	0	0	0	0	0	0	0	46	1	0	0	47	3	1	3	0	0	7	1	46	0	0	0	47	101	
15:15:00	2	1	3	0	14	6	0	58	3	0	0	61	5	2	3	0	1	10	2	54	7	0	1	63	140	
15:30:00	0	2	1	0	1	3	1	54	2	0	2	57	1	0	1	0	1	2	2	36	2	0	0	40	102	
15:45:00	0	2	5	0	3	7	0	56	0	0	8	56	4	1	2	0	4	7	2	56	4	0	0	62	132	475
16:00:00	2	1	4	0	2	7	0	50	2	0	0	52	1	5	1	0	1	7	2	45	3	0	0	50	116	490
16:15:00	1	3	4	0	6	8	0	54	2	0	1	56	0	0	0	0	5	0	1	63	2	0	0	66	130	480
16:30:00	0	0	1	0	2	1	0	53	3	0	5	56	4	0	1	0	5	5	3	52	2	0	0	57	119	497
16:45:00	1	0	6	0	5	7	0	53	3	0	0	56	2	1	0	0	12	3	2	50	1	0	0	53	119	484
17:00:00	1	2	3	0	8	6	1	66	2	0	1	69	4	3	0	0	0	7	3	65	3	0	0	71	153	521
17:15:00	1	0	0	0	3	1	1	63	2	0	4	66	2	1	1	0	0	4	3	49	5	0	0	57	128	519
17:30:00	0	0	0	0	0	0	0	49	5	0	3	54	4	1	2	0	2	7	2	39	0	0	0	41	102	502
17:45:00	2	1	5	0	2	8	0	47	0	0	2	47	1	2	4	0	0	7	0	43	0	0	0	43	105	488
18:00:00	1	3	3	0	0	7	0	29	4	0	3	33	0	0	0	0	0	0	3	37	1	0	0	41	81	416
18:15:00	1	1	2	0	0	4	0	44	1	0	0	45	0	0	1	0	3	1	1	27	3	0	1	31	81	369
18:30:00	0	0	5	0	4	5	1	39	4	0	1	44	2	2	1	0	3	5	1	31	0	0	0	32	86	353
18:45:00	1	0	1	0	5	2	0	40	1	0	8	41	1	0	0	0	2	1	1	22	1	0	1	24	68	316
Grand Total	26	18	111	0	66	155	12	1383	48	0	41	1443	60	26	49	0	47	135	40	1431	45	0	5	1516	**3249**	-
Approach%	16.8%	11.6%	71.6%	0%		-	0.8%	95.8%	3.3%	0%		-	44.4%	19.3%	36.3%	0%		-	2.6%	94.4%	3%	0%		-	-	-
Totals %	0.8%	0.6%	3.4%	0%		4.8%	0.4%	42.6%	1.5%	0%		44.4%	1.8%	0.8%	1.5%	0%		4.2%	1.2%	44%	1.4%	0%		46.7%	-	-
Heavy	1	0	4	0		-	1	145	1	0		-	4	0	2	0		-	0	130	1	0		-	-	-
Heavy %	3.8%	0%	3.6%	0%		-	8.3%	10.5%	2.1%	0%		-	6.7%	0%	4.1%	0%		-	0%	9.1%	2.2%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Spectrum

Turning Movement Count
Location Name: MAIN ST & OSPREY ST
Date: Tue, Oct 04, 2022 Deployment Lead: Peter Ilias

Crozier & Associates
SUITE 301 40 HURON STREET
COLLINGWOOD ONTARIO, L9Y 4R3
CANADA

Peak Hour: 08:15 AM - 09:15 AM Weather: Scattered Clouds (3.88 °C)

Start Time	N Approach OSPREY ST						E Approach MAIN ST						S Approach OSPREY ST						W Approach MAIN ST						Int. Total (15 min)
	R ght	Thru	Left	UTurn	Peds	Approach Tota	R ght	Thru	Left	UTurn	Peds	Approach Tota	R ght	Thru	Left	UTurn	Peds	Approach Tota	R ght	Thru	Left	UTurn	Peds	Approach Tota	
08:15:00	1	0	5	0	1	6	0	47	0	0	0	47	1	0	7	0	0	8	1	45	1	0	0	47	108
08:30:00	1	2	4	0	0	7	0	49	2	0	0	51	4	1	6	0	1	11	1	60	0	0	0	61	130
08:45:00	1	0	3	0	2	4	0	41	0	0	0	41	3	2	1	0	1	6	1	68	1	0	0	70	121
09:00:00	0	0	1	0	2	1	1	43	2	0	1	46	3	0	0	0	3	3	1	50	5	0	0	56	106
Grand Total	3	2	13	0	5	18	1	180	4	0	1	185	11	3	14	0	5	28	4	223	7	0	0	234	**465**
Approach%	16.7%	11.1%	72.2%	0%		-	0.5%	97.3%	2.2%	0%		-	39.3%	10.7%	50%	0%		-	1.7%	95.3%	3%	0%		-	**-**
Totals %	0.6%	0.4%	2.8%	0%		3.9%	0.2%	38.7%	0.9%	0%		39.8%	2.4%	0.6%	3%	0%		6%	0.9%	48%	1.5%	0%		50.3%	**-**
PHF	0.75	0.25	0.65	0		0.64	0.25	0.92	0.5	0		0.91	0.69	0.38	0.5	0		0.64	1	0.82	0.35	0		0.84	**-**
Heavy	0	0	3	0		3	0	24	0	0		24	2	0	1	0		3	0	33	0	0		33	**-**
Heavy %	0%	0%	23.1%	0%		16.7%	0%	13.3%	0%	0%		13%	18.2%	0%	7.1%	0%		10.7%	0%	14.8%	0%	0%		14.1%	**-**
Lights	3	2	10	0		15	1	156	4	0		161	9	3	13	0		25	4	190	7	0		201	**-**
Lights %	100%	100%	76.9%	0%		83.3%	100%	86.7%	100%	0%		87%	81.8%	100%	92.9%	0%		89.3%	100%	85.2%	100%	0%		85.9%	**-**
Single-Unit Trucks	0	0	1	0		1	0	13	0	0		13	1	0	0	0		1	0	18	0	0		18	**-**
Single-Unit Trucks %	0%	0%	7.7%	0%		5.6%	0%	7.2%	0%	0%		7%	9.1%	0%	0%	0%		3.6%	0%	8.1%	0%	0%		7.7%	**-**
Buses	0	0	2	0		2	0	4	0	0		4	1	0	1	0		2	0	5	0	0		5	**-**
Buses %	0%	0%	15.4%	0%		11.1%	0%	2.2%	0%	0%		2.2%	9.1%	0%	7.1%	0%		7.1%	0%	2.2%	0%	0%		2.1%	**-**
Articulated Trucks	0	0	0	0		0	0	7	0	0		7	0	0	0	0		0	0	10	0	0		10	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	0%	3.9%	0%	0%		3.8%	0%	0%	0%	0%		0%	0%	4.5%	0%	0%		4.3%	**-**
Bicycles on Road	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	**-**
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	-	5	-	-	-	-	-	1	-	-	-	-	-	4	-	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	-	45.5%		-	-	-	-	9.1%		-	-	-	-	36.4%		-	-	-	-	0%		**-**
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	9.1%		-	-	-	-	0%		**-**

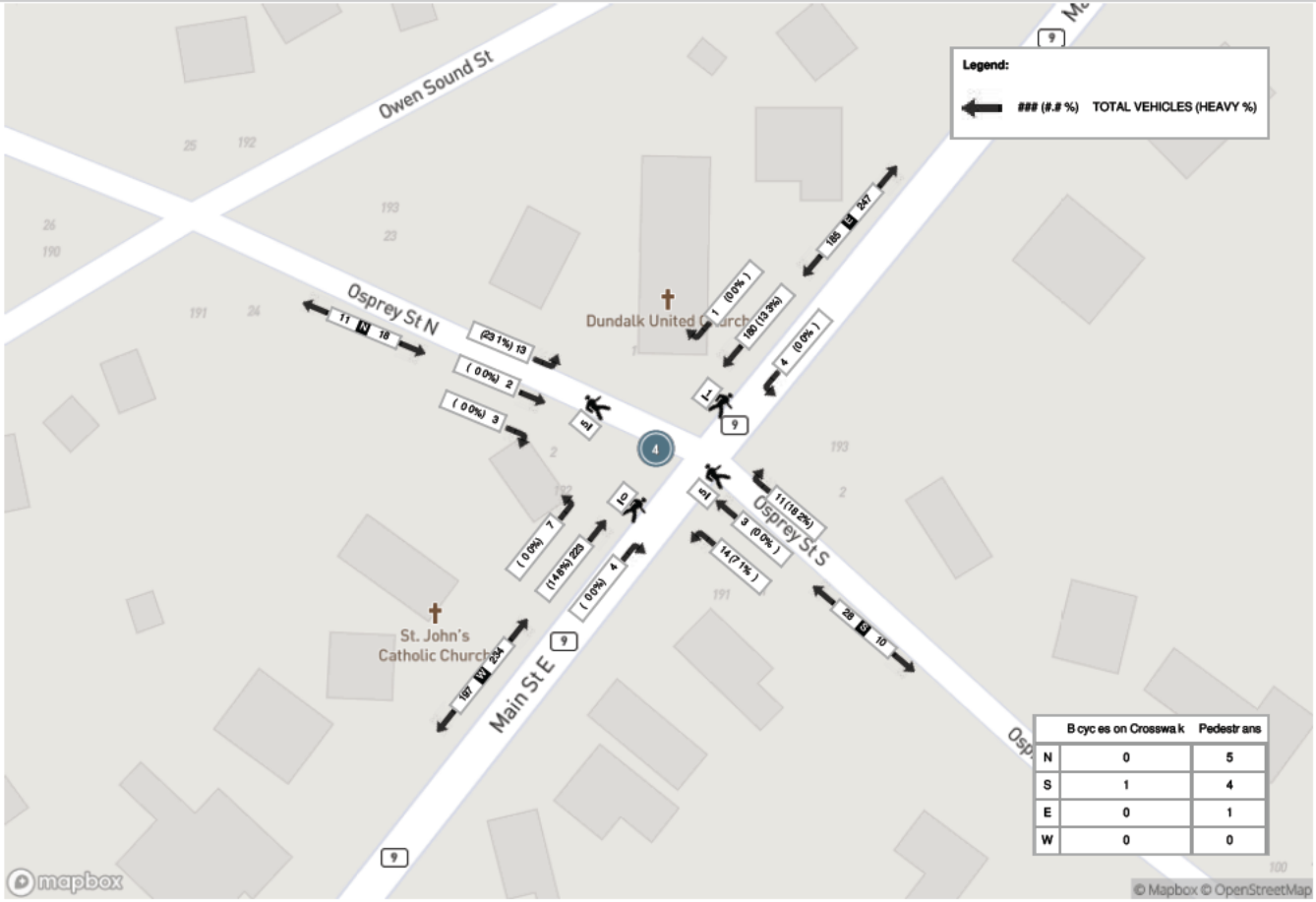
Crozier & Associates
SUITE 301 40 HURON STREET
COLLINGWOOD ONTARIO, L9Y 4R3
CANADA

Peak Hour: 04:15 PM - 05:15 PM Weather: Broken Clouds (19.31 °C)

Start Time	N Approach OSPREY ST						E Approach MAIN ST						S Approach OSPREY ST						W Approach MAIN ST						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Tota	Right	Thru	Left	UTurn	Peds	Approach Tota	Right	Thru	Left	UTurn	Peds	Approach Tota	Right	Thru	Left	UTurn	Peds	Approach Tota	
16:15:00	1	3	4	0	6	8	0	54	2	0	1	56	0	0	0	0	5	0	1	63	2	0	0	66	130
16:30:00	0	0	1	0	2	1	0	53	3	0	5	56	4	0	1	0	5	5	3	52	2	0	0	57	119
16:45:00	1	0	6	0	5	7	0	53	3	0	0	56	2	1	0	0	12	3	2	50	1	0	0	53	119
17:00:00	1	2	3	0	8	6	1	66	2	0	1	69	4	3	0	0	0	7	3	65	3	0	0	71	153
Grand Total	**3**	**5**	**14**	**0**	**21**	**22**	**1**	**226**	**10**	**0**	**7**	**237**	**10**	**4**	**1**	**0**	**22**	**15**	**9**	**230**	**8**	**0**	**0**	**247**	**521**
Approach%	13.6%	22.7%	63.6%	0%		-	0.4%	95.4%	4.2%	0%		-	66.7%	26.7%	6.7%	0%		-	3.6%	93.1%	3.2%	0%		-	-
Totals %	0.6%	1%	2.7%	0%		4.2%	0.2%	43.4%	1.9%	0%		45.5%	1.9%	0.8%	0.2%	0%		2.9%	1.7%	44.1%	1.5%	0%		47.4%	-
PHF	0.75	0.42	0.58	0		0.69	0.25	0.86	0.83	0		0.86	0.63	0.33	0.25	0		0.54	0.75	0.88	0.67	0		0.87	-
Heavy	1	0	0	0		1	0	15	0	0		15	0	0	0	0		0	0	15	0	0		15	-
Heavy %	33.3%	0%	0%	0%		4.5%	0%	6.6%	0%	0%		6.3%	0%	0%	0%	0%		0%	0%	6.5%	0%	0%		6.1%	-
Lights	2	5	14	0		21	1	211	10	0		222	10	4	1	0		15	9	214	8	0		231	-
Lights %	66.7%	100%	100%	0%		95.5%	100%	93.4%	100%	0%		93.7%	100%	100%	100%	0%		100%	100%	93%	100%	0%		93.5%	-
Single-Unit Trucks	1	0	0	0		1	0	6	0	0		6	0	0	0	0		0	0	5	0	0		5	-
Single-Unit Trucks %	33.3%	0%	0%	0%		4.5%	0%	2.7%	0%	0%		2.5%	0%	0%	0%	0%		0%	0%	2.2%	0%	0%		2%	-
Buses	0	0	0	0		0	0	2	0	0		2	0	0	0	0		0	0	6	0	0		6	-
Buses %	0%	0%	0%	0%		0%	0%	0.9%	0%	0%		0.8%	0%	0%	0%	0%		0%	0%	2.6%	0%	0%		2.4%	-
Articulated Trucks	0	0	0	0		0	0	7	0	0		7	0	0	0	0		0	0	4	0	0		4	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	3.1%	0%	0%		3%	0%	0%	0%	0%		0%	0%	1.7%	0%	0%		1.6%	-
Bicycles on Road	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	-
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.4%	0%	0%		0.4%	-
Pedestrians	-	-	-	-	21	-	-	-	-	-	6	-	-	-	-	-	22	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	42%		-	-	-	-	12%		-	-	-	-	44%		-	-	-	-	0%		-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	2%		-	-	-	-	0%		-	-	-	-	0%		-

Crozier & Associates
SUITE 301 40 HURON STREET
COLLINGWOOD ONTARIO, L9Y 4R3
CANADA

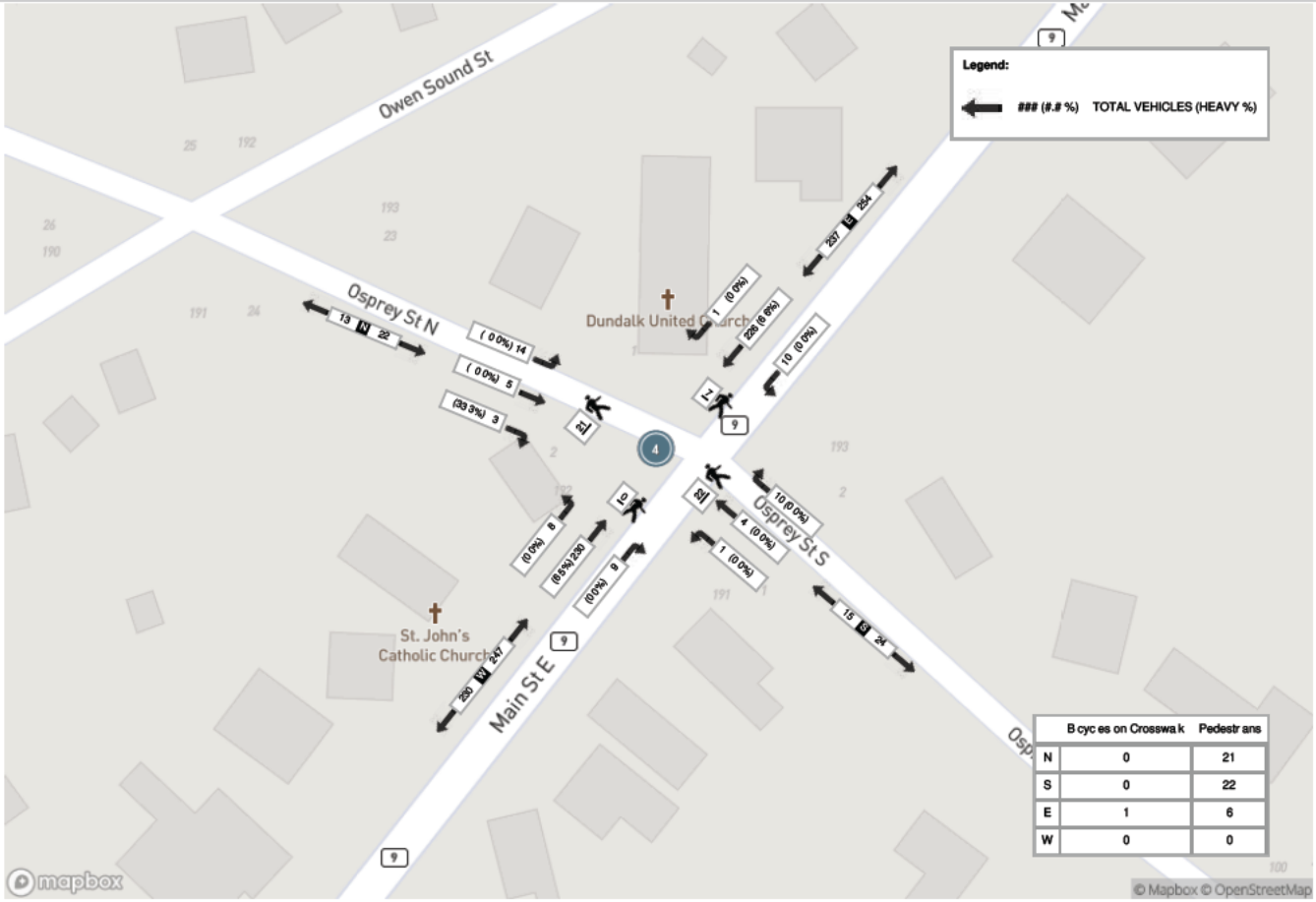
Peak Hour: 08:15 AM - 09:15 AM **Weather: Scattered Clouds (3.88 °C)**



	Bicycles on Crosswalk	Pedestrians
N	0	5
S	1	4
E	0	1
W	0	0

Crozier & Associates
SUITE 301 40 HURON STREET
COLLINGWOOD ONTARIO, L9Y 4R3
CANADA

Peak Hour: 04:15 PM - 05:15 PM **Weather: Broken Clouds (19.31 °C)**



	Bicycles on Crosswalk	Pedestrians
N	0	21
S	0	22
E	1	6
W	0	0

2022 Existing

AM (PM) Peak Hour Volumes

			←	185	(237)
			↓		
(254)	247	→	←	→	
		↓			

2025 Existing

Growth Rate	2%
Years	3
Growth Factor	1.061208

			←	196	(252)
			↓		
(270)	262	→	←	→	
		↓			

Site Volumes

			←		
			↓	2	(7)
		→	←	→	
		↓		8	
				(4)	

2025 Total Volumes

			←	196	(252)
			↓	2	(7)
(270)	262	→	←	→	
(0)	0	↓	0	8	
			(0)	(4)	

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	262	0	2	196	0	8
Future Volume (Veh/h)	262	0	2	196	0	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	285	0	2	213	0	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			285		502	285
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			285		502	285
tC, single (s)			4.2		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.4
p0 queue free %			100		100	99
cM capacity (veh/h)			1217		532	724

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	285	215	9
Volume Left	0	2	0
Volume Right	0	0	9
cSH	1700	1217	724
Volume to Capacity	0.17	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.3
Control Delay (s)	0.0	0.1	10.0
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	10.0
Approach LOS			B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	270	0	7	252	0	4
Future Volume (Veh/h)	270	0	7	252	0	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	293	0	8	274	0	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			293		583	293
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			293		583	293
tC, single (s)			4.2		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.4
p0 queue free %			99		100	99
cM capacity (veh/h)			1241		475	735

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	293	282	4
Volume Left	0	8	0
Volume Right	0	0	4
cSH	1700	1241	735
Volume to Capacity	0.17	0.01	0.01
Queue Length 95th (m)	0.0	0.2	0.1
Control Delay (s)	0.0	0.3	9.9
Lane LOS		A	A
Approach Delay (s)	0.0	0.3	9.9
Approach LOS			A

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		28.9%	ICU Level of Service
Analysis Period (min)		15	

Attachment F

Relevant TAC GDGCR Excerpts

$$SSD = 0.278Vt + 0.039 \frac{V^2}{a} \quad (2.5.2)$$

Where:

SSD = Stopping sight distance (m)
t = Brake reaction time, 2.5 s
V = Design speed (km/h)
a = Deceleration rate (m/s^2)

Table 2.5.2 gives the minimum stopping sight distances on level grade, on wet pavement, for a range of design speeds. These values are used for vertical curve design, intersection geometry and the placement of traffic control devices. The stopping sight distances quoted in **Table 2.5.2** may need to be increased for a variety of reasons related to grade and vehicle type as noted below.

Table 2.5.2: Stopping Sight Distance on level roadways for Automobiles[54]

Design speed (km/h)	Brake reaction distance (m)	Braking distance on level (m)	Stopping sight distance	
			Calculated (m)	Design (m)
20	13.9	4.6	18.5	20
30	20.9	10.3	31.2	35
40	27.8	18.4	46.2	50
50	34.8	28.7	63.5	65
60	41.7	41.3	83.0	85
70	48.7	56.2	104.9	105
80	55.6	73.4	129.0	130
90	62.6	92.9	155.5	160
100	69.5	114.7	184.2	185
110	76.5	138.8	215.3	220
120	83.4	165.2	248.6	250
130	90.4	193.8	284.2	285

Note: Brake reaction distance predicated on a time of 2.5 s; deceleration rate of 3.4 m/s^2 used to determine calculated sight distance.

The Effect of Grade

Braking distances will increase on downgrades and decrease on upgrades. When the roadway is on a grade, formula 2.5.1 for braking distance is modified as follows:

$$d_b = \frac{V^2}{254\,[(a/9.81) + G]} \quad (2.5.3)$$

Where:

d_b = Braking distance (m)
V = Design speed (km/h)
a = Deceleration rate (m/s^2)
G = Grade (m/m) (G is positive if vehicles uphill and negative if downhill)

collector roadways, while a 3.0 m minimum is the suggested dimension for both commercial and industrial land uses. If there is a need to provide parallel parking between driveways along the roadway, a spacing of 6.0 to 7.5 m is suitable. If the spacing provided is in the range of 3.0 to 5.0 m, the space may appear inviting to a driver wishing to park, but if used, severely hampers the operation of the driveways by reducing sight lines and interfering with the turning paths of the vehicles.

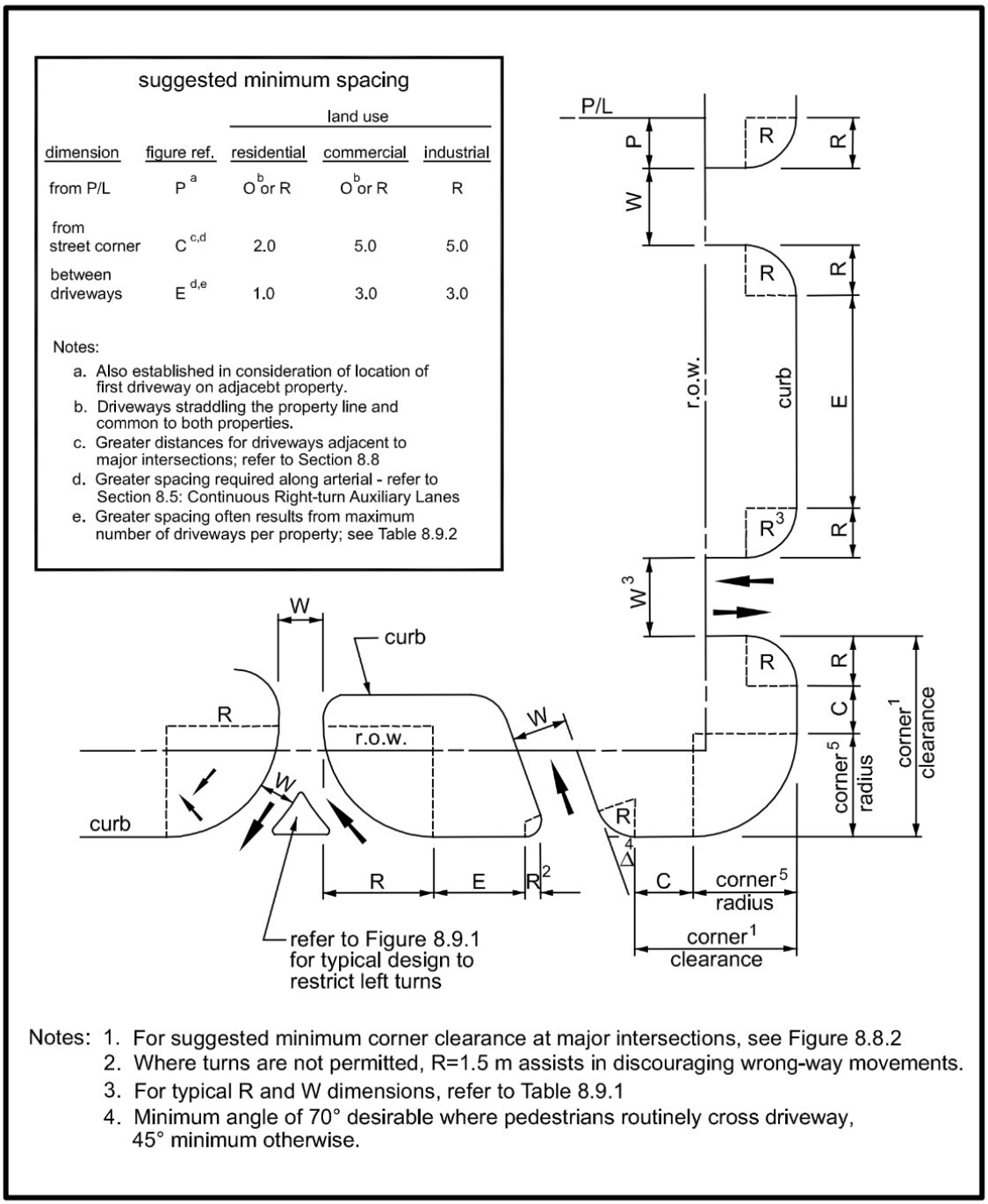


Figure 8.9.2: Driveway Spacing Guidelines – Locals and Collectors

Table 9.9.4: Design Intersection Sight Distance – Case B1, Left Turn From Stop

Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)
20	20	41.7	45
30	35	62.6	65
40	50	83.4	85
50	65	104.3	105
60	85	125.1	130
70	105	146.0	150
80	130	166.8	170
90	160	187.7	190
100	185	208.5	210
110	220	229.4	230
120	250	250.2	255
130	285	271.1	275

Note: Intersection sight distance shown is for a stopped passenger car to turn left onto a two-lane highway with no median and grades 3% or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.

Sight distance design for left turns at divided-highway intersections should consider multiple design vehicles and median width. If the design vehicle used to determine sight distance for a divided-highway intersection is larger than a passenger car, then sight distance for left turns will need to be checked for that selected design vehicle and for smaller design vehicles as well. If the divided-highway median is wide enough to store the design vehicle with a clearance to the through lanes of approximately 1 m at both ends of the vehicle, no separate analysis for the departure sight triangle for left turns is needed on the minor-road approach for the near roadway to the left. In most cases, the departure sight triangle for right turns (case B2) will provide sufficient sight distance for a passenger car to cross the near roadway to reach the median. Possible exceptions are addressed in the discussion of case B3.

Table 9.9.6: Design Intersection Sight Distance – Case B2, Right Turn from Stop, and Case B3, Crossing Maneuver

Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)
20	20	36.1	40
30	35	54.2	55
40	50	72.3	75
50	65	90.4	95
60	85	108.4	110
70	105	126.5	130
80	130	144.6	145
90	160	162.6	165
100	185	180.7	185
110	220	198.8	200
120	250	216.8	220
130	285	234.9	235

Note: Intersection sight distance shown is for a stopped passenger car to turn right onto or to cross a two-lane highway with no median and with grades of 3% or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.

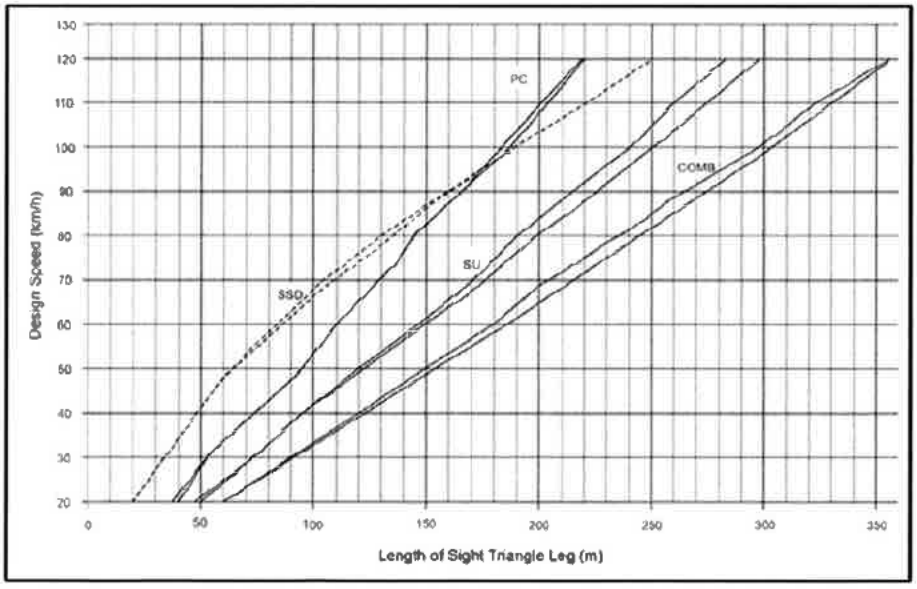
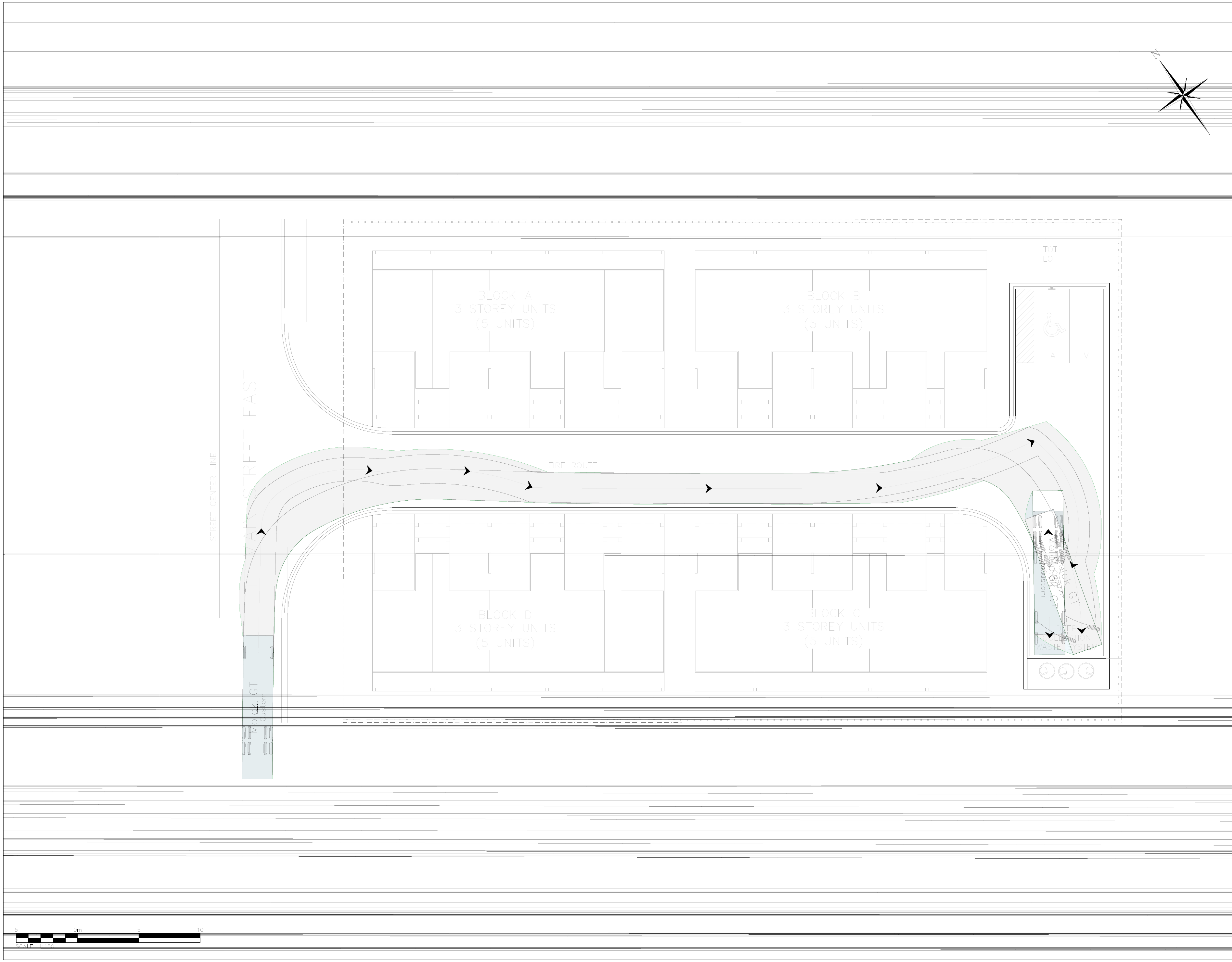


Figure 9.9.5: Intersection Sight Distance – Case B2, Right Turn from Stop, and Case B3, Crossing Maneuver (Calculated and Design Values Plotted)

Attachment G

Vehicle Maneuvering Diagrams



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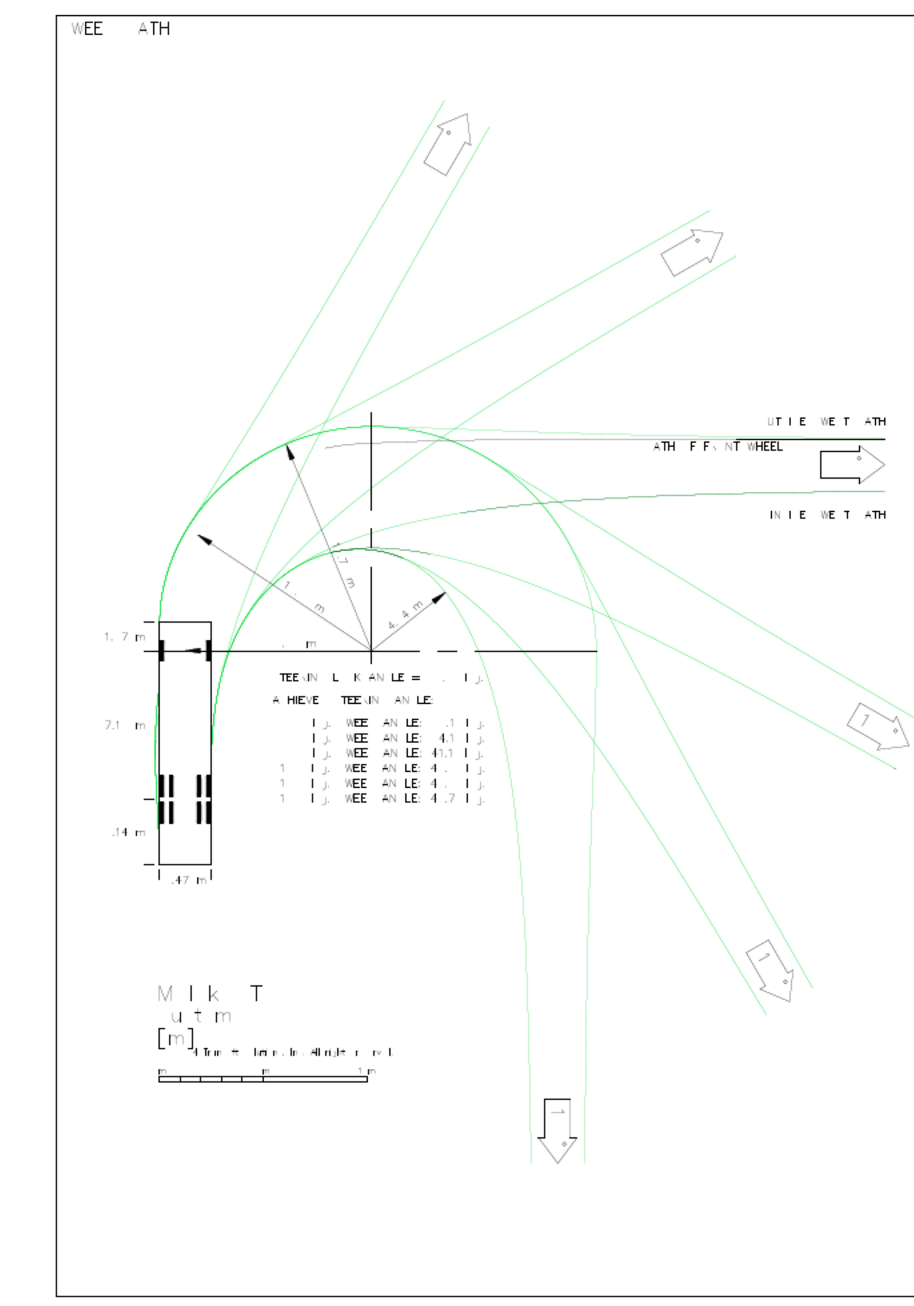

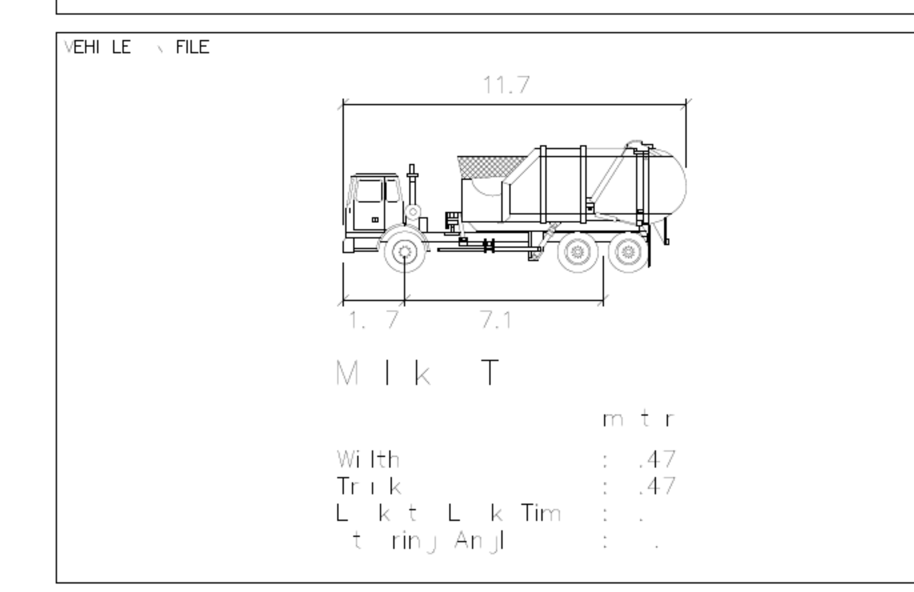

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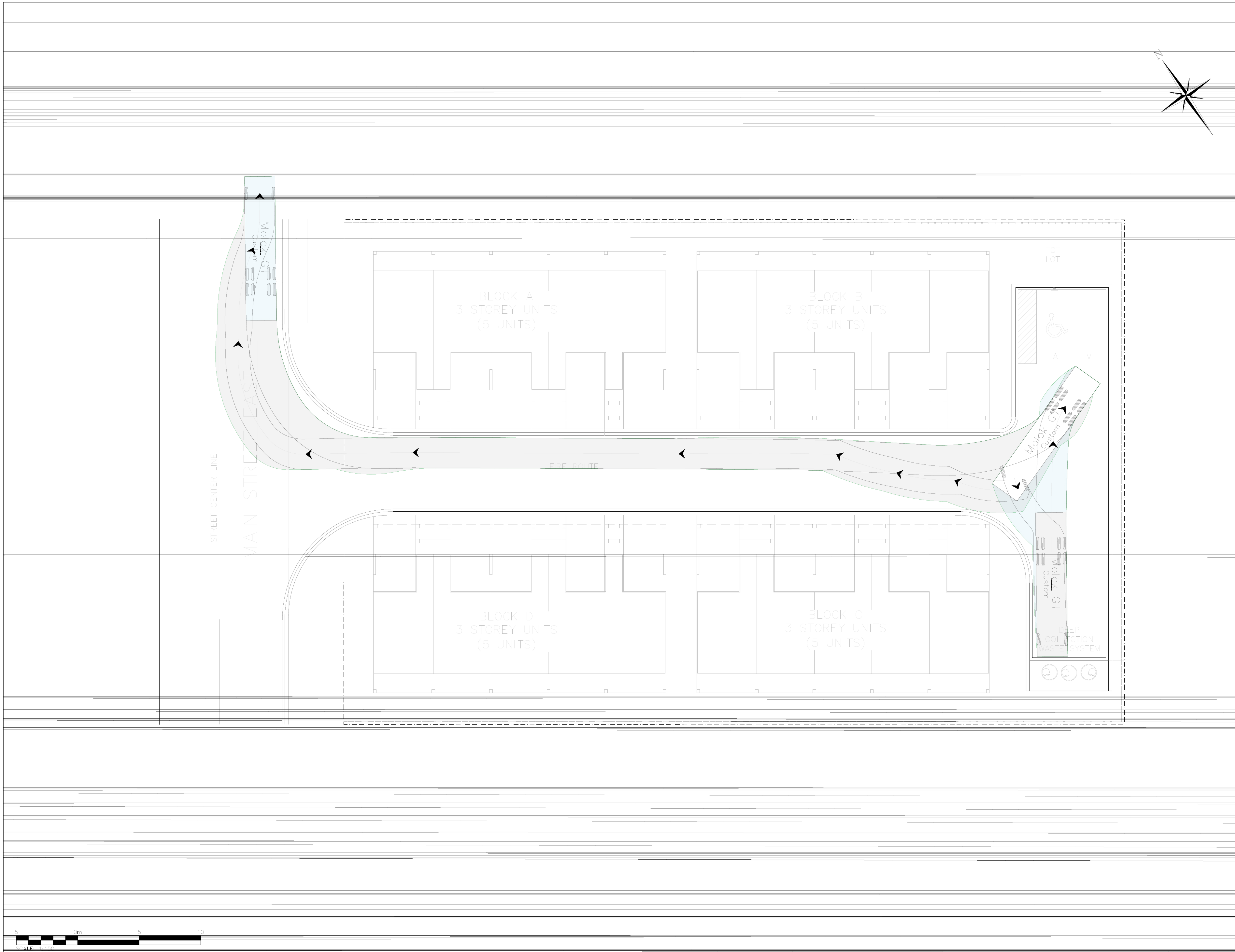

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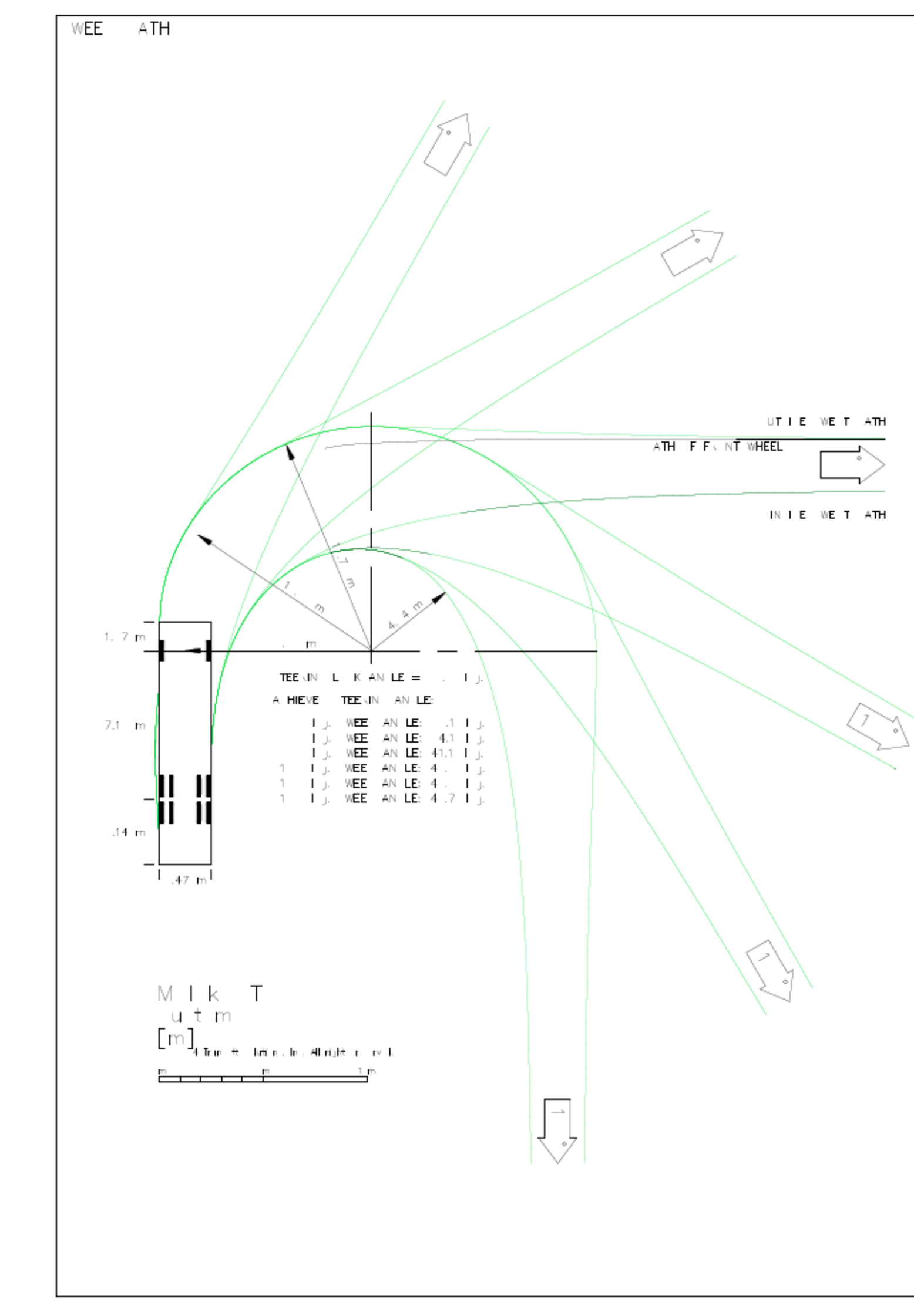

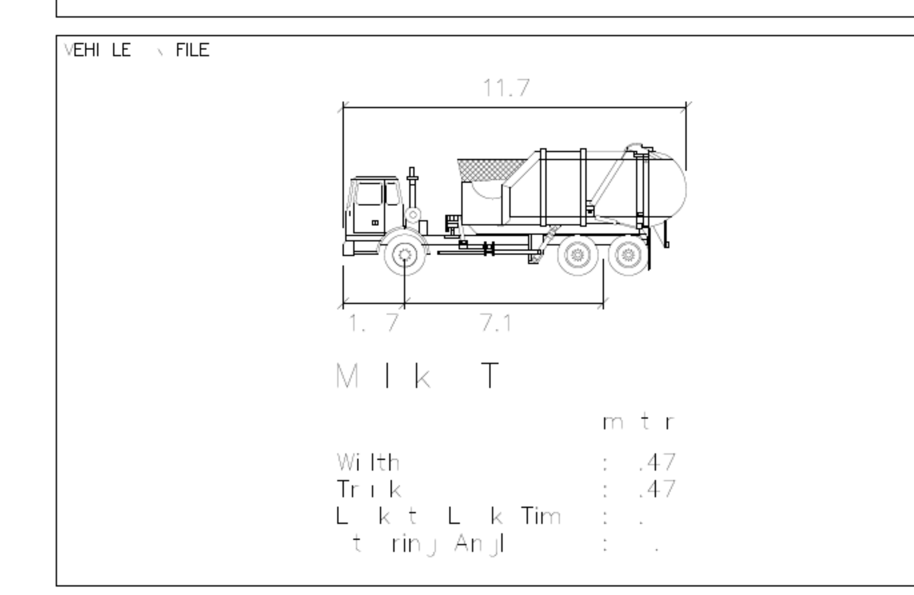

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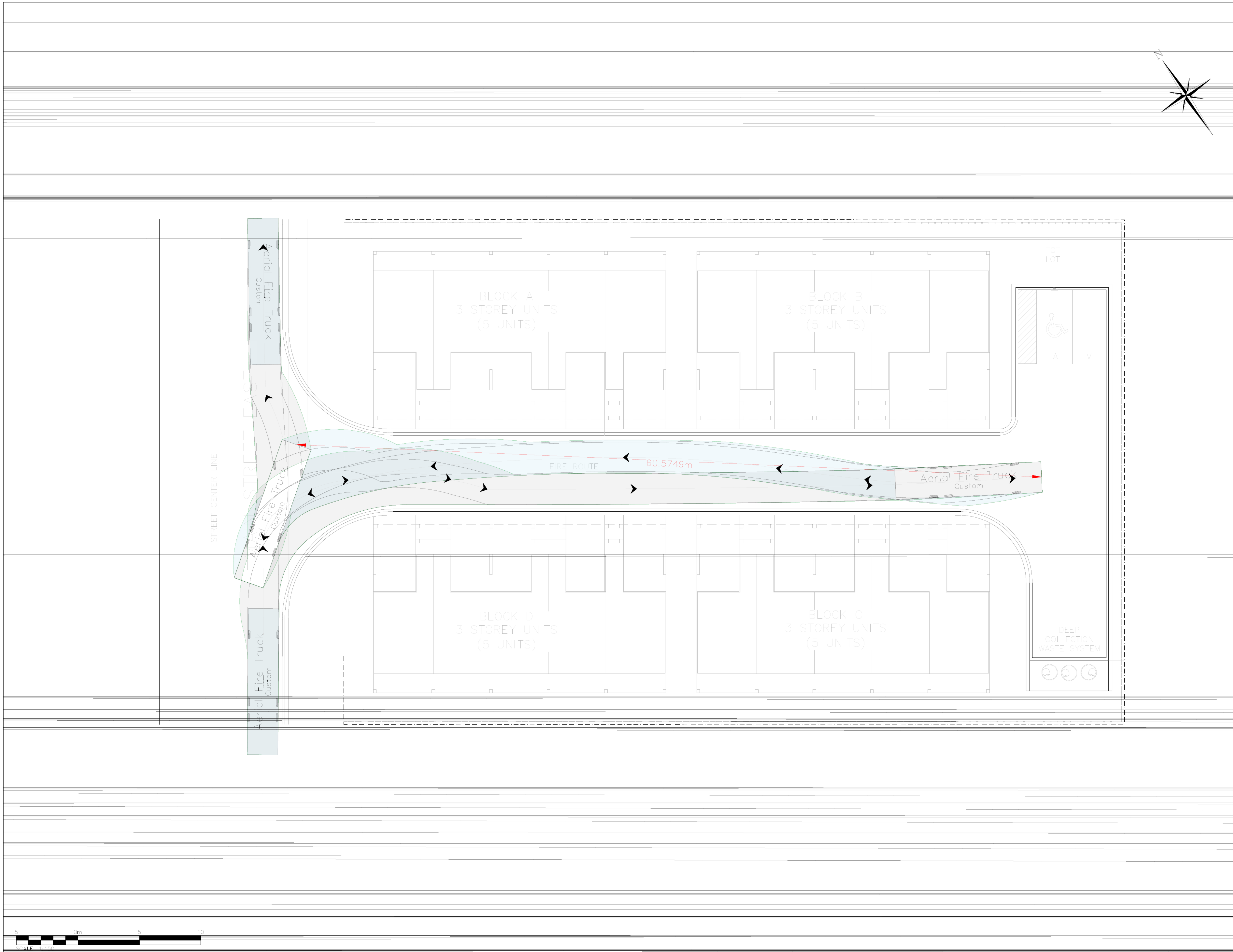

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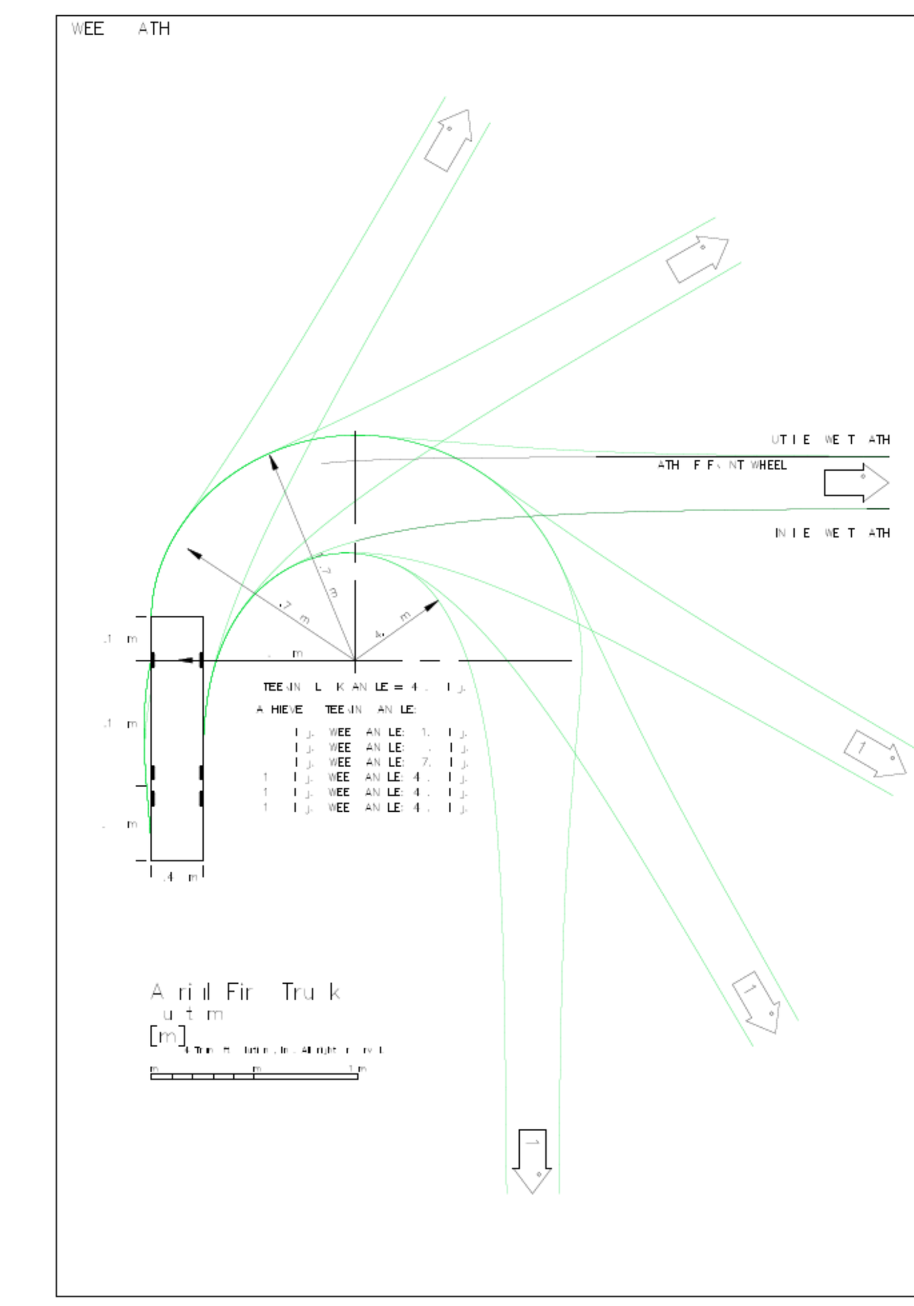

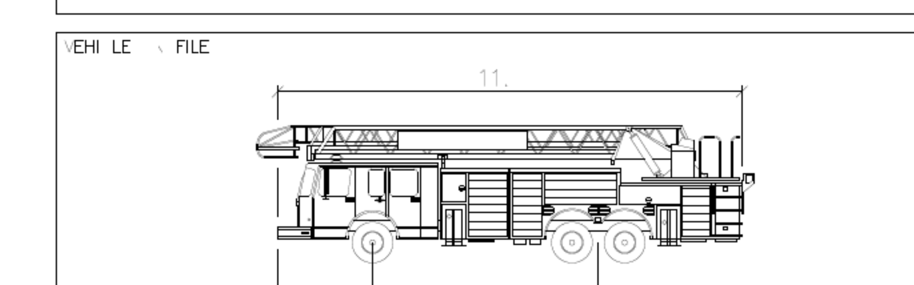

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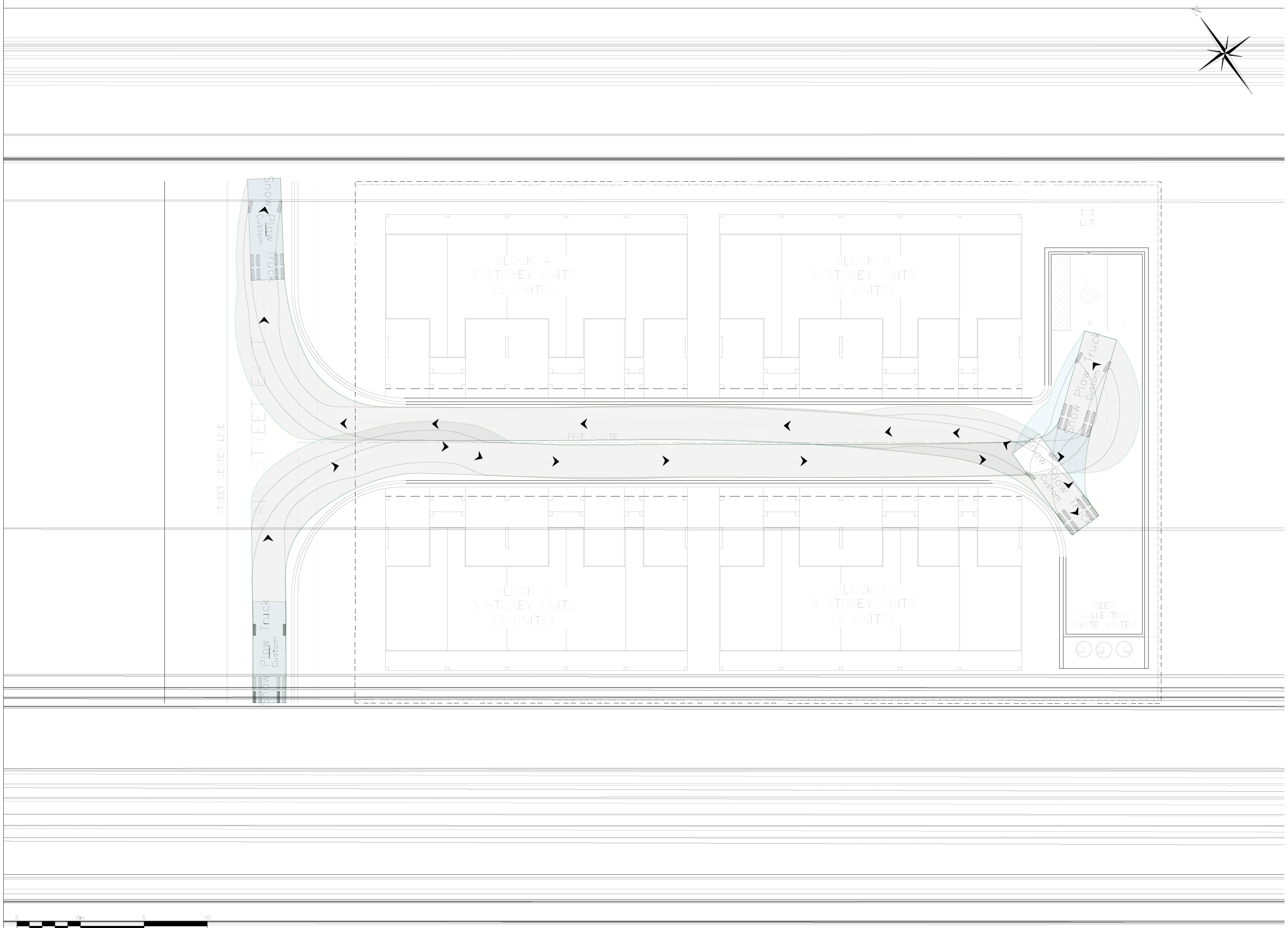

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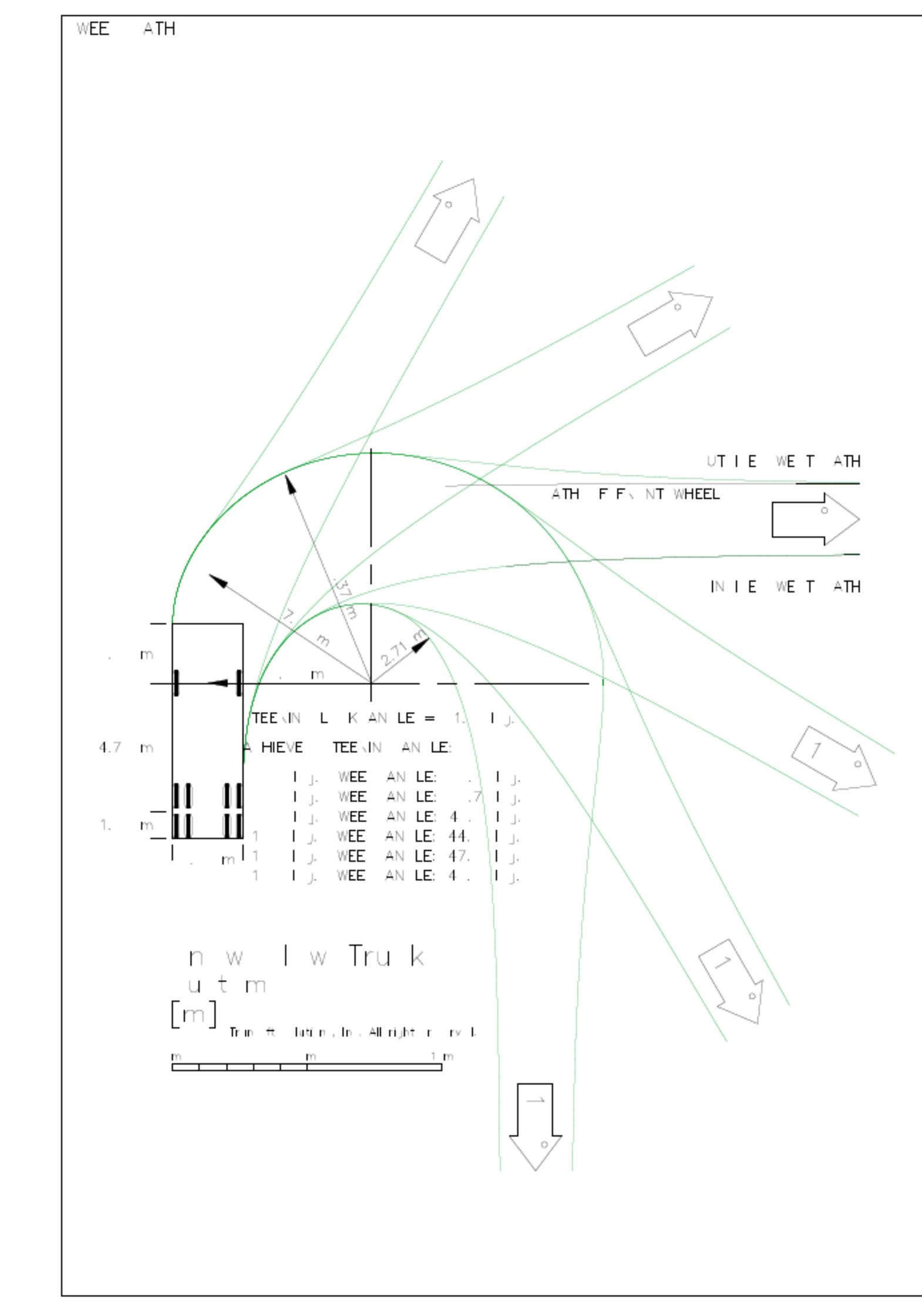

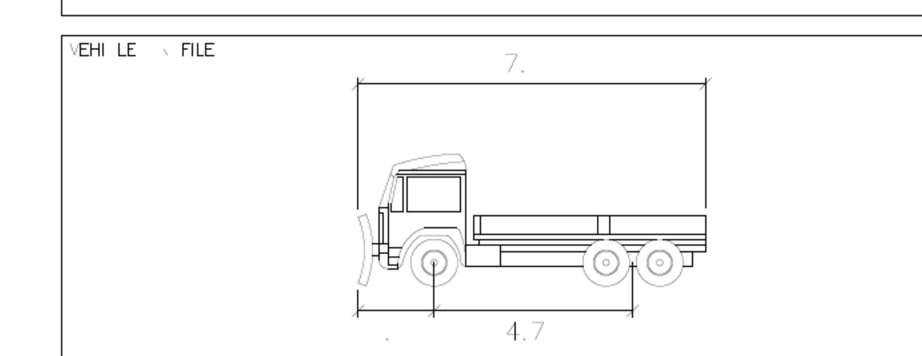

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